AUTOMATION AND RAPID ADOPTION OF ARTIFICIAL INTELLIGENCE IN THE FIELD OF CONSULTING, AND ITS IMPLICATIONS FOR THE HUMAN WORKFORCE.

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by

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Abstract

This doctoral thesis investigates an issue faced by the IT consultants and associates of Princeton Pragmatics, a small IT consulting services start-up in New Jersey, USA. Since the summer of 2017, the companies in the USA relying on IT solutions, particularly in sectors such as financial services, experienced a rapidly emerging trend adopting Artificial Intelligence (AI) and modern forms of automation. As a result, the IT professionals' typical work is gradually becoming automated, threatening the demand for the IT consultants' current skills. Hence, this research examines "**what strategies could Princeton Pragmatics and its IT consultant partners pursue in response to emerging trends in the adoption of automation and AI technologies?**" as its overarching research question.

The unit of analysis of this research is the IT consultant, the typical kind of associate who works with Princeton Pragmatics to cater to their clients. Hence the research was conducted as collaborative action research, which involved the primary researcher being an insider participant. The action research consisted of four research cycles leading to activities done within the collaborative action research group formed among six Princeton Pragmatics associates. The action research group's input was supplemented by seventeen recorded interviews with a different group of participants. By doing qualitative analysis on the data and using scholarly literature as a third voice, the researcher makes multiple findings related to the research problem.

Through this analysis, the researcher discovers that experienced IT professionals can become vulnerable to three vicious cycles that can prevent them from remaining marketable. The analysis further revealed that it is necessary to employ attitude changes among IT professionals to avoid getting entangled in these vicious cycles. This research delivers an actionable model consisting of three heuristic devices used as a decision support tool by the IT consultants in this situation.

Since not much research available on this topic currently, this study has many implications for IT practitioners. Also, quite notably, this is one of those action research conducted during the COVID-19 global pandemic. Due to the techniques used during the data collection, the research activities were not that much disrupted. Hence, this study has several axiological values to the scholarly community interested in action research.

Dedication

To my father Percy, who could not live to see the completion of this work; my mother Jinani who taught me to appreciate the value of education above anything else; my wife Kalanie who was generous enough to sacrifice time and other resources available from me; my two children Udana and Ruvaneka who counted days till I finish this work; and to my eldest brother “Lokka” who had been my mentor during the early stages of my journey in academia.

Acknowledgement

Scholarly work of this kind requires a lot of dedication, sacrifices and effort to minimise errors and meeting the required standards. This thesis is my first work of its kind, which required more than two years of fieldwork and research. Such an effort cannot be made without help from many others.

First and foremost, I must thank my research supervisor Dr Paul Ellwood for his help, guidance, and support towards completing this work in a manner that is in adherence to the standards of a doctoral thesis accepted by the University of Liverpool. I was fortunate to work under his supervision which was an important factor which enabled me to complete this work in a timely manner. His conscientious approach to reviewing my work helped me to discover the areas to improve in this thesis before compiling the final version.

After all, this work will not be complete unless it becomes successful in the examination process. Hence, the feedback from the second supervisor is vital during the preparatory stages. Therefore, I would like to thank Dr Jill Shepherd for the detailed feedback given to me about this thesis.

As a doctoral student, I had to complete nine different modules necessary to develop the scholarly practitioner skills before undertaking a large research project of this kind. During the initial two and a half years of the DBA programme, I was taught by multiple management school academics of the University of Liverpool. Therefore, I would like to thank the management school's academic staff for educating me in these knowledge areas.

The most important part of this thesis is the collection of its data. It would have been impossible to accomplish that work without the outstanding support given by the colleagues of my collaborative action research group and the interview participants. The collaborative research group participants also helped me validate the actionable model during the fourth action research cycle. I want to thank them for all the support.

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List of Acronyms

AI	Artificial Intelligence
AWS	Amazon Web Services
CAL	Critical Action Learning
COVID-19	Coronavirus Disease of 2019
CTC	Cynicism Towards Change
CTO	Chief Technology Officer
DBA	Doctor of Business Administration
HPC	High-Performance Computing
HR	Human Resource
IBM	International Business Machines
IT	Information technology
KYC	Know Your Customer
MIT	Massachusetts Institute of Technology
NASA	National Aeronautics and Space Administration
OCR	Optical Character Recognition
ORJI	Observation, Reaction, Judgement, and Intervention
PIF	Participant Information Sheet
POC	Proof of Concepts
RPA	Robotic Process Automation
TMS	Transactive Memory System
UN	United Nations
U.S	United States
USA	United States of America
VAT	Value Added Tax

Chapter One – Research problem and the context

1.1 Introduction

Based on my observations, the information technology (IT) consultants' services have been a popular source for large corporations to fill their human resource staff needs on the east coast of the United States. In the environment where my practice is located, IT consultants help organisations build custom software applications, support the operation of such complex systems, and even help their clients to manage the business process. As of 2019, it is a 484-billion-dollar revenue industry employing over 2.3 million consultants in the USA (IBISWorld, 2019).

This thesis explores strategic issues surrounding my small start-up IT consulting organisation within this vast industry of the United States. During my initial framing of the problem, I understood it as an issue resulting from the emergence of a new breed of technical capabilities powered by artificial intelligence (AI) and automation (Murashov et al., 2016; HDFC Bank,2017; McBride, 2017; Stasse et al., 2017; CNBC, 2018; Nizri, 2021). Other observations provided reasonable evidence on several IT-industry wide trends emerging now. For example, McCormick (2020) provides evidence of leading technology companies making products that can automate the task of software coding. It shows that not just traditional software development tasks but also the work done by an army of data scientists can be now automated with Google Cloud platforms machine learning capabilities. A future jobs report from the World Economic Forum reveals that, now, the window of opportunity available to the workforce to reskill has been narrowing (Zahidi et al., 2020, P6). It is also evident that there will be more machines than humans involved in information and data processing and complex technical tasks by 2025 (Ibid, 2020, P.29). When it comes to the demand for technical skills, the skills such as software development, project management, database and network professionals seem to lag way behind modern skills like data scientists, AI, machine learning and big data (Ibid, 2020, P.29). Several other pieces of evidence suggest that some of the popular skills used by IT consultants, such as database administration (Walters, 2020), system administration, have faced a lack of relevance or huge impact (Tandog, 2020). The trends in low-code automation (Nizri, 2021) and tools that

eliminate the requirement of programmers to do automation (Applause, 2021) do not deliver favourable news for those software development professionals who expect to benefit during automation tasks. Due to these trends emerging in the IT industry, I was more inclined to believe that these issues are related to a more significant trend that is intertwined with the consulting industry, which is manifested in the form of losing the demand for IT consultants, such as software developers. While this overall complexity cannot be ignored, the thesis will primarily focus on helping my company navigate the situation.

1.2 My organisation

This company which I founded, called Princeton Pragmatics, is an IT and business consultancy company located in New Jersey, USA. It makes revenue from two different streams. The first revenue stream involves providing the service of IT consultants who have the information technology know-how and business acumen to fill the resource needs of the client companies in their projects. When making revenue in the second stream, the company helps the client companies to find the right matches for the available full-time positions. This second revenue stream is possible because it enables the client company to use the service of multiple suppliers to search the employment candidates confidentially. My company's clientele is currently concentrated in the financial and retail industries in the United States.

Princeton Pragmatics can be considered as a tiny start-up enterprise that is trying to find growth in its market while navigating through various barriers to entry. The business clients of this company are huge corporations that can afford highly-paid, experienced professionals. As I have understood during contract negotiations, such large corporations do not directly deal with recent start-ups. However, my company finds consulting work in these firms via complex business agreements. Those are formed with larger consulting companies in a sub-contracting arrangement in which a larger consulting company would hire resources through my small company to fill their consulting positions within large global corporates. These sub-contracting arrangements can be considered as strategic alliances between multiple consulting firms. Establishing such contracts is quite popular in the United States. Only by gaining maturity as a company in this manner opens the opportunity to be considered as a direct supplier to large corporations. While doing the business, I have found

that, in the case of mid-size or smaller growth firms which are business clients looking for IT resources, this situation is different. Such companies do not work with every consulting company. They rely on finding suppliers of IT consultants for full-time employee referrals through personal references. My company has been able to form a direct supplier relationship with smaller or medium-sized businesses that need to find IT professionals for their needs.

Princeton Pragmatics' business model does not heavily rely on many assets or many full-time employees in its payroll. That is because, irrespective of whether they are IT consultants who work in client's projects or whether they work in the client's payroll directly, they do not have to work in the premises of Princeton Pragmatics. As a result, my company does not need large premises or other assets. The main difference between the two approaches in making revenue for Princeton Pragmatics is how payments are received via its two different types of service offerings. A consulting engagement would require the whole duration of the project to pay off the company's consultancy fee. A full-time career placement would pay off the fee as a lump sum. Clients of this company recruit professionals via Princeton Pragmatics to engage them in very high-tech projects, which mostly involve automation and machine intelligence.

1.3 The organisational issue under investigation

My organisation markets the skill of human IT consultants. It is a services company that relies on using traditional software engineering and business consulting skills as its offerings. Many projects which Princeton Pragmatics undertakes involve automation of existing processes carried out by humans. The work carried out by an IT consultant this way can potentially become the first and the last job of that IT consultant for the given client. Eventually, the very same skills used to build such automated solutions are likely to be out of demand. It could happen because the AI-enabled applications do not necessarily need a software engineer to write programs at the same level as before. If an AI system can understand user requirements by directly interacting with that user, the demand for human IT requirement analysts is likely to diminish. In some cases, the client companies may do this

ubiquitous adoption of AI without even knowing whether that is the right solution they need. In other cases, the adoption of the right AI technology could mean future prosperity.

Currently, this emerging trend whose future state [what it would look like in five years from now] has started diminishing the demand for the current service offering of Princeton Pragmatics. What my company currently supports is the development of traditional systems that are not heavily integrated with AI. The rapid emergence of the new breeds of AI capabilities makes it difficult to keep the available skillset (offerings) more current. It has also become challenging to choose appropriate automation decisions as the future consequences of such decisions are not yet very clear. Some of our clients require assistance and recommendations to automate their existing human worker-centric business processes using modern AI and cloud computing providers which enable such capabilities. However, at this stage, there is not much knowledge about the consequences of adopting such technologies. For example, an AI-enabled marketing campaign generator installed in a client company could replace about 500 human employees who have been doing various jobs related to direct mailing campaigns for decades.

1.3.1 Why has this become an issue?

Most of the projects undertaken by Princeton Pragmatics rely on transforming existing manual work and introducing automation. That is to increase productivity within client companies where these projects are implemented. Such projects demand unique skills and a lot of experience from IT consultants. The experienced IT consultants have about fifteen to twenty-five years of career behind them. They either bring software development skills, system or enterprise architecture skills, business analysis skills or management skills. Traditionally, the software systems they build require them to code algorithms that describe how to do the work by computers. This activity involves a lot of programming, software development and testing effort with the help of the technologists. Their long career evolves by using the skills that were required to instruct how computers could do their tasks. Hence, the very experienced IT consultants have their existing skills concentrated in the areas which are more suited to traditional software development work. Modern artificial intelligence

applications are a result of such work. However, when artificial intelligence can close the gap between human skills and machine skills, the original technologies become not necessary anymore. Currently, artificial intelligence has been able to do many things which appeared impossible to be done by machines. The types of technologies are emerging at a rapid pace, as evidenced by statistics published by the International Federation of Robotics, a non-profit organisation connecting the world of robotics (IFR, 2018a; IFR, 2018b; IFR, 2018c), making existing ones obsolete. As the adoption of robotics, AI, and automation accelerate the rate at which these technologies are competing with IT consultants' work increases. As a result, to be marketable in the consulting industry, very experienced technologists must change to be able to provide value to the new market. Nevertheless, the direction of the required change is unclear because the situation is emerging.

The IT consultants are unclear how the technology will change within the next five to ten years. It is also unclear how the end-users will adopt artificial intelligence changing the nature of the future consulting market. Hiring less experienced technologists who only have spent time on becoming accustomed to the most current technologies is not straightforward. That is because they do not have the necessary career experience to make difficult technology decisions. Besides, what is current today is going to change very soon. The market preferences for technology skills demanded from technologists is a moving target.

A typical technology project would require business analysts to capture requirements from the business environment and articulate what needs to be built as a solution. Modern AI applications can maintain meaningful conversations with humans (CNBC, 2018). Machine learning [deep learning] makes it possible for the machines to learn to do a task while on the job (Stevens, 2016, p.6). As a result, it would be quite possible that the amount of work that is going to be available for IT business analysts is shrinking. If not, how the IT business analysts must work is rapidly changing. Resource management and decision making, such as performance evaluations, can also be delegated to machines. In such situations, the management professionals who work as IT consultants or employees, irrespective of the type of their employment, will also have to live with the consequence of the emerging situation.

Like any other technology such as the television or the internet, the modern AI and automation technology species are likely to bring opportunities to the job market (Autor,

2015). The real issue is that it is still unclear what form of opportunities will emerge in which areas of the job market (Susskind and Susskind, 2018). As a small start-up consulting company, Princeton Pragmatics needs to work with the IT consultants to develop a sustainable path to strengthen their marketability in the job market and re-think how to re-align its business in light of the emerging trend.

1.3.2 Other stakeholder interests

The existing clients and the potential clients of Princeton Pragmatics have hiring managers and other decision-makers who represent an essential segment of the stakeholders. Princeton Pragmatics finds IT consultants and the candidates for full-time referrals from the job market in the United States via personal referrals or by searching candidates in the job market to supply the needs of these clients. These individuals are available to find work from any company in the United States. Therefore, the existing professionals who work in the current projects with clients, and potential resources, represent another group of stakeholders I will be referring to as "IT consultants".

The above two stakeholder categories have direct relevance to this issue, and any solutions discovered during this research would be of importance to them. Therefore, the stakeholders of these two categories will be interested in the knowledge produced in the research and the insight which they can use to drive change in their individual approach or in their organisations.

There is another stakeholder category whom I call "domain experts" who may not be directly interested in the organisation solutions, which may be applicable to Princeton Pragmatics. They have unique expert knowledge of the changing landscape of AI and Automation. The domain experts are likely interested in how the organisations providing AI and automation applications will benefit or be harmed due to the emerging problem.

1.4 Background and the context of the technology landscape supported by IT consultants

When analysing a complicated situation, I find it helpful to understand its context and background. In this thesis, I am exploring an organisational context that is in the IT

consulting industry. Therefore, it is crucial for this research to be cognizant about how the technology landscape responds to the emerging trend.

To understand this context, I used scholarly articles as the main source of information. Within the scholarly articles, I found that the opinion of the scholars has been divided into two opposing claims (Susskind and Susskind, 2018). One group of scholars claim that emerging Artificial Intelligence products are no different from any other innovation that changed society. During each such trend, humans have new ways to find work, and new opportunities had arrived. Therefore, this time, it is not going to be different. The second group of scholars provide various arguments suggesting that it is different this time. This dichotomy of scholarly perspectives prompted me to find other contributors to contemporary discourse on this subject. Such sources were found in the form of fictions [that influenced the progression of AI], news media, websites and other publications, and statistics provided by professionals and thought leaders. I did not ignore fiction while connecting the dots because when it comes to paradigm-shifting technologies, which I have seen, many ideas were inspired by science fiction (Ahlin, 2018). Various statistics and news available in the internet media (IFR, 2018a; IFR, 2018b; IFR, 2018c) provided strong indications that helped me evaluate the gravity of the emerging change. Within the last two to three years, there has been a growing trend in automating humans' work using computer programs and Artificial Intelligence. The latter part of 2017 revealed more significant advancement in Humanoid robots (CNBC, 2018). Therefore, each type of evidence was instrumental in building my current perspective on the issue.

Several scholars who had evaluated the effects of the technologies that can perform the tasks done by humans have been able to identify multiple categories of substitutes for human workers. They can be found in the form of hardware [physically tangible machines] or software [computer programs]. McClure (2018) describes types of substitutes for humans which have Artificial Intelligence capabilities. Blumenthal (1985) describes another type called programmable automation. More human-like machines called the 'Humanoids' have been described by several scholars (McBride, 2017; Stasse et al., 2017). It is also evidenced that systems that can replace human workers do not have to be human look-alike (Garfinkel et al., 2017). When it comes to robots, Murashov et al. (2016) recognise three main

categories called ‘Industrial Robots’, ‘Professional and Service Robots and Collaborative robots. According to those authors, another fourth kind, called managerial robots (Ibid, p.D61), is also emerging.

The scholarly article of McClure (2018) states that the types of technologies that can perform tasks that humans can do are taking away the jobs of humans while it creates different jobs on the other hand (Ibid, p.153). The evidence in this scholar’s claims may be a result of organisations taking initiatives to do innovation. Whether such innovations that take away the jobs done by humans are well coordinated towards humans’ well-being is worthy of exploration. I will explore sources outside of the scholarly community to investigate this topic in the latter part of this section.

A recent study done by two MIT scholars suggests that ‘rapid acceleration of digitisation can lead to economic disruptions as many people can eventually be unemployed as a result of the abilities of the computers improve rapidly (Brynjolfsson and McAfee, cited in Autor 2015). As per Stevens (2016), the Federal Reserve chairwoman Janet Yellen had also made a similar observation on income moving towards capital rather than labour. According to Brynjolfsson and McAfee, owners of capital prefer machines because they do not get sick, do not require other benefits such as vacation, weekend off time and other hygiene factors required by humans. They suggest that instead of competing with machines, the human workforce could use machines to complement how they work (Stevens, 2016).

Autor’s observations from his research suggest that journalists and expert commentators might be overstating the risk; however, technology changes the labour market by changing the types and the nature of jobs and what is paid for the job (Autor 2015). Furthermore, Autor shows that the introduction of machines in the workflow increases the remaining humans’ economic value in the process. He believes that humans have tacit knowledge that machines cannot mimic due to what is known as ‘Polanyi’s paradox’ (Autor, 2015). Another sharp critique of automation sceptics is McClure (2018), who is convinced that people show anxiety towards things they do not understand. He states that mostly technophobic people consist of people who have a lesser education background and underprivileged nature.

The above-explored idea that the scepticism about the recent development of AI comes from technophobic people with a lesser educated background is not left unchallenged by the other

scholars. Stevens (2016) contradicts Autor's idea and argues that the labour force is getting substituted by 'Cloud Robots' and deep learning algorithms. These capabilities can make machines closing the gap between them and humans, which previously caused what is known as 'Polanyi's paradox' (Autor, 2015). Even scholars at MIT and Silicon Valley entrepreneur like Martin Ford (Stevens, 2016) are some of the reputed people who do not belong to the category of technophobes, which McClure (2018) describes.

The effort of Stevens (2016) aims to understand whether the fears that 'it is different this time' when it comes to automation and AI are justified and to suggest a policy-based solution. According to him, a report by the National Academy of Engineering seems to suggest that almost half of the jobs in the U.S will be vulnerable to technology displacement (Ibid, p. 367). Among the great believers of the idea that 'it would be completely different this time' is Martin Ford. He states that it is the jobs that provide the buying power that can run the economy. Technology can complicate things in periods like the great recession by adversely affecting employment and wages (Ibid, p.369). Brynjolfsson and McAfee suggest a two-fold solution that focuses on education, entrepreneurship, more efficient job matching systems, rewards for innovation, immigration reforms, upgrading infrastructure, and a Pigouvian tax system (Stevens, 2016). As a long-term solution, they suggest negative income, VAT schemes, consumption, and crowdsourcing. However, Martin Ford does not believe that education will be able to cope with technological unemployment (Stevens, 2016, p.370). He proposes a government-managed income scheme fuelled with income-worthy activities.

Another important matter which was explored within the peer-reviewed sources was whether there is a strong case to suggest that the substitutes for human workers will, in fact, be embraced by humans. A research was conducted by Thellman et al. (2017) aimed at comparing people's judgement of robots' behaviour compared to that of humans and animals. It revealed that people's intentional stance towards robots is very similar to their stance towards humans (Ibid, p.1). These initial observations lead me to assume that, in general, society may embrace the machines that can mimic human behaviour, even if their influence on them can be different this time. This tendency of humans to compare similar experiences with other humans to that with machines may not result in robust assessments

all the time. For example, Newman (2014) brings an interesting point to the discussion on ethically conflicting decision choices that need to be handled when designing self-driven cars. For example, should the self-driven car be programmed to save its passenger or someone else? During an accident, a human driver may not have time to make such a quick decision, but given the speed of computers, that kind of decision making may become critical. However, there are no clear-cut answers to such ethical questions. This claim would be alarming to IT professionals because their efforts would ultimately produce decision-making machines.

The above peer-reviewed publications show the divide of the scholarly community's perspectives related to the facts considered regarding the context of the issue. However, the commentaries I could find from the third-party sources, such as YouTube videos from prominent technology visionaries (Ritm1, 2019; Tech Vision, 2020), seem to align more with the scholars who think that *'this time it is different'* (Stevens, 2016).

As the initial focus of this section to understanding arguments from the sources outside of the scholars, it is worth finding if the trend of job displacements would contribute to society's sustainability. When considering an authority responsible for guiding the future development of human society, for further discussing the relevance of the point made by McClure (2018) about job displacement (Ibid, p.153), it is hard to find a better institution than the United Nations. According to the United Nations website, the United Nations' sustainable development goals give much prominence to employment, economic growth, and decent work for humans (UN, 2018a). These goals expect technology and innovation to provide environmentally sound innovation. In other words, the United Nations fundamentally believe that 'development will not happen without innovation'. It appears that the United Nations have started promoting educating the younger generation towards developing awareness on robotics which suggests that the future of AI adoption is likely to gain global support (UN, 2018b). The adoption of technology by no means should threaten the sustainability of society. If it eliminates jobs, it will not help to maintain a sustainable society. On the other hand, if artificial intelligence and automation can benefit society, it has to show how it contributes to long-term sustainability.

The debates and other news feeds circulating on the world wide web provide evidence that more technological evangelists are making sceptic reactions to the emerging situation. For example, one of the stronger critics of artificial intelligence is Elon Musk, a billionaire technology visionary, a man who attempts to put people on Mars before anyone else (Saber Teeth of St. Croix, 2017; The School of Shelf, 2017).

A most recent development suggests that robots and AI applications are becoming smarter in their ability to explain during unexpected situations. The question-and-answer session conducted by the famous robot named Sophia (CGTN America,2019) demonstrated how machines could easily explain their responses. Although humanoid robots in workplaces in the positions held by humans are extreme, the initial adoption of this in the financial industry has already emerged. In HDFC Bank (2017), it is evident that this trend of adopting human-like technologies at the workplace is not only happening within the US.

The questions we face today related to the adoption of AI had been envisioned in the earliest twentieth century by science fiction writers, and they prescribed how the future security of humans can be achieved against the incorrect use of artificial intelligence. In his short science fiction named 'Runaround' (Asimov, 1942; Murashov et al., 2016), Asimov described three laws (moral principles) that govern the behaviour of Robots (supposed to be intelligent). These moral codes are designed under the assumption that humans and machines have some sort of a master-slave relationship in which humanity's superiority is preserved. That way, he thought that the anxieties of humans could be addressed. From the news feeds, the most recent trends reveal to us that the future of artificial intelligence is evolving in a different direction than what Asimov (Asimov, 1942) had prescribed. Society has already recognised humanoids as a part of the society [Saudi Arabia has offered citizenship to a robot] (CNBC, 2018). Humans' reactions to the robot Sophia (CGTN America, 2019) reveal that the machines' historical evolution has reached a new era of their development. When at the receiving end, if humans find it easier to interact with human-like machines, they are likely to accept the involvement of machines in tasks that were absolutely meant to be done by humans before. Such recent developments which treat humanoids in equal status to humans (CNBC, 2018) introduce a need to re-evaluate whether AI will always be there to work for humans or not.

From a science fiction's point of view, Asimov's moral codes, if followed, could be a viable solution to the anxieties around the issue. Nevertheless, the more recent learning produced by scholarly publication discussed above (Newman, 2014) seems to suggest that in real-world problems implementing such moral codes may not be as straightforward as science fiction writers thought several decades ago.

Now that scholarly debates and the other evidence from third-party information sources have been carefully analysed, it is worthy of discussing what this knowledge means to the improvement of understanding related to Princeton Pragmatics' organisational issue. The two major sources of information (scholarly and non-scholarly) maintain different standards in generating their claims. When building a context to the research problem, I understand that by synthesising the scholarly claims with the practitioner claims, I may not produce accurate knowledge right-away from the perspective of scholarly research. However, constructing an opinion informed by both sources as follows would help me become familiar with the context that needs exploration at this pre-stage of the research. This pre-understanding helps me to formulate the initial statement of the problem. But it needs further validations done through formal data collection and analysis using a research method that is acceptable to the scholarly standards. Hence, what follows in the remainder of this sub-section is my initially developed understanding of how this problem context would affect Princeton Pragmatics.

The nature of artificial intelligence is that it requires training the machine to do work than coding the context-specific logic using computer language. Once one machine is trained, it is possible to clone them in large numbers. In the case of humans, it requires years to train an individual. When the machines did not have these capabilities, software engineers had to write complex software applications. Gathering requirements to develop such applications require the service of IT business analysts who could translate the end user's requirement to technology requirements. Translation of requirements to applications happens as technology projects managed by people, resource, and project managers. These applications are usually built to serve companies that are outside of the technology industry. They are usually institutions like financial, retail or any other non-information technology-related companies. Therefore, the competency of developing such applications has never been the core-

competency of the end-user company. Therefore, such companies hire IT consultants to do such tasks. If a machine can learn new skills without having to code, then many of the jobs which require the help of IT specialists will not be needed. In a better scenario, the way IT specialists work must change. The same skills which have been generating income will no longer become attractive in the job market.

The disruptions in the labour market happen before the machines reached their full maturity. For example, I have witnessed in the consulting industry that, soon after software release, change management and monitoring tasks are automated, many infrastructures maintenance professionals had to look for other jobs. These automated processes are created by involving software developers. However, creating such automated tasks could be the first and the last work available for the software developer in a technology project. Once the project is over, the software developers, too, must find a different project. Things have become different for IT consultants from what it was three years ago from now.

The contextual analysis done so far from the available literature and news media show evidence of increasing automation and the adoption of novel types of artificial intelligence products. The scholarly community is divided on whether the nature of the disruption is different this time or not. Some evidence available from the internet and media and my concerns about Princeton Pragmatics current situation in the light of the emerging trend is consistent with those academics and experts who have generated rhetoric that it is different this time.

The material covered under this initial exploration of the context of the information technology landscape seems to shape my perspective to think that the adoption of AI to substitute the work done by human workers [IT consultants] will not stop. As evidenced by Autor (2015), several waves of automating trends were met with serious resistance from humans. But eventually, people had become familiar with the new technology.

If the same inductive assumptions of Autor (2015) are right this time, the IT consultants who work with Princeton Pragmatics must first understand how they can change to keep up with the trend. As the facts presented in this section revealed (Stevens, 2016, p.367), if job displacements are inevitable in the near future, and the future approach to do IT consulting is going to change, then Princeton Pragmatics has to think if these displacements will impact

the type of consultancy service offerings done by the company today. In a larger scheme of things, how things will affect the IT consultants, and Princeton Pragmatics must be understood using local knowledge, which I could not find from any of the scholarly literature or rhetoric available in the news and the internet media. Generating such local knowledge requires the collaboration of individuals who know about my company.

1.5 My Place within the issue

In Princeton Pragmatics, I hold two roles. In 2017, I founded this company as an entrepreneur. I became the first employee of the company, and the first consulting resource to be marketed to the end clients. Since then, I hold another income-generating role as an IT consultant. Therefore, my exposure to the organisational issue is twofold. I face the consequences of the emerging phenomenon as a technology consultant who leads architectural and development of automation efforts for Princeton Pragmatics' client companies. In this role, I have a similar experience to other IT consultants.

My company's core competencies are achieved as a collective effort of fellow IT consultants, including that of mine. As the emerging situation unfolds, it is the core competencies and their demand that will be affected. Therefore, as an entrepreneur who is responsible for the well-being of the company, I have the utmost responsibility to ensure my company's strategy does not fall apart. Suppose the outcome of the research suggests that the existing strategy does not work. It will be my primary responsibility to ensure that the necessary steps towards strategic renewal are taken.

As the company owner, I am required to keep everyone together and ensure that the issues are handled. In my opinion, the organisation's greatest strength is the IT consultants who provide services to the clients. Therefore, it is necessary for me to carefully look at how to ensure the existing IT consultants' marketability and find where the opportunities for finding new revenue streams arise.

Princeton Pragmatics becoming successful in finding its solution to the issue being studied in this thesis is very important to my career. But in addition to that, I have an additional responsibility to work as an insider researcher and conduct the research. As Roth, Shani and

Leary (2007) pointed out; I am required to simultaneously handle the role-duality of working as the 'Entrepreneur/IT consultant' and the academic researcher.

1.6 The scope, research questions and objectives

The scope of this research will be limited to analysing and finding solutions to a strategic issue existing within Princeton Pragmatics. Since that company is a result of the collaboration of IT consultants, my unit of analysis in this research will be the IT consultants. The past research on the impact of Artificial Intelligence applications on IT consultants is very minimal. The reason could be that, for a long time, 'Polanyi's paradox' (Autor, 2015) had protected the professionals with sensorimotor skills from the competition with machines because machines could not easily acquire tacit skills of humans. During the last two years, however, this gap has been narrowing (CNBC, 2018). This lack of local knowledge to inform the process of finding solutions to the issue prompted me to initiate this action research with the following objective. That is to take actions and learn from them during my pursuit to empower fellow IT consultants, including myself, to gain the necessary skills and decision-making ability to sustain employment as IT consultants. In so doing, I intend to improve the clarity of the emerging situation and guide strategic renewal using the success of fellow IT consultants as a foundation.

In this DBA thesis, my analysis will be centred around the IT consultants to determine if the issue described earlier in this chapter can be refined and then generate actionable knowledge that will be useful to the IT consultants. The actionable knowledge may prescribe micro-level strategies which individuals can apply to themselves to become marketable as IT consultants in the future. The insights from the IT consultants, which will be generated in the process of discovering the actionable knowledge, will then be used as input to initiate a double-loop learning (Argyris, 2002) mechanism to re-think the strategy of Princeton Pragmatics. This double-loop learning capability could be an important outcome of the actionable model or the process which this research promises to deliver. That model or the process could ensure that the individuals who use it will be able to re-assess the steps followed by the process during the previous actions, and then re-adjust the methods and techniques to improve the process itself so that the model and the process can produce better actionable results.

Therefore, the scope involves investigating how the human workforce, including IT consultants, could change to be able to adapt to the future work environment and use the developing trends for their advancement and become sustainable in the future workforce. Hence, the overarching research question is "**What strategies could Princeton Pragmatics and its IT consultant partners pursue in response to emerging trends in the adoption of automation and AI technologies?**". This overarching research question would imply that this research would contain multiple activities, including the following.

- It involves understanding the related trends within the consulting sector.
- It involves developing a response at the level of individual IT consultants.
- It involves developing a strategic response within the level of Princeton Pragmatics as a firm.

This research will be conducted as an insider action research done within Princeton Pragmatics. Hence, the scope of the action research will be limited to taking actions by the individuals within Princeton pragmatics. It would not involve interventions within companies outside of Princeton Pragmatics.

The fellow IT consultants involved in the research are either currently working for projects via Princeton Pragmatics or individuals who are available in the job market, which that company can access. The action research group that will be formed for the research requires about six members on a voluntary basis. With help from the research group, I will be conducting iterative action research. The first cycle will be a problematizing cycle. The definition of the problem, the overarching research question and the sub-research questions will be re-evaluated as a collective effort directed towards co-generating new knowledge related to the problem being investigated. The research group participants bring multiple perspectives to the research problem as each one of them has different levels of exposure and experience with the problem. As a collective research group, sensemaking helps to refine the understanding of the problem and determine what type of knowledge is missing from what can be known about it. Based on the identified gaps, the data collection scheme will be generated in the form of interview questionnaires targeted towards individuals who might be able to provide input. These detailed questionnaires will form the basis for the next research cycle related to the data collection.

The collected data will be analysed using a qualitative thematic analysis technique (Creswell, 2013). The analytical data and further reviewed scholarly literature will contribute to developing an actionable model that can be applied within my organisational environment. The actionable model would likely inform the following areas of management activity.

- Actions that can be taken by each type of stakeholder.
- Recommendations on processual approaches to the way things are done, including future consulting market analysis, and how decision making is done on augmenting human workers with technology.
- Adjustments to the strategy of Princeton Pragmatics if the target state envisioned by the model desires to do so.

Once the analysis cycle of the research produces the actionable model, it will follow an iterative review cycle which will use double-loop learning (Argyris, 2002) to validate the model. As it appears today, the nature of the problem is like a moving target, and the problem changes its face continuously. As a result, the model may require continuous validation and review beyond the scope of the DBA thesis.

The second chapter of this thesis is dedicated to elaborating in detail the design of the action research project, while the third chapter would explain how the first action research cycle was carried out to improve the understanding of the research problem. How the large amount of qualitative data collected from the interviews; is described in chapter four. In this research, the scholarly literature plays the role of a third voice. As a result, chapter five will unfold the synthesis of the scholarly literature (the subject of which is informed by the earlier cycles of action research with the project's participants). Chapter six outlines the design of the actionable model, which would help the IT professionals to make decisions to take actions towards navigating the issue. Chapter seven describes how this action model is validated. The final chapter, which is chapter eight, provides a discussion and overall conclusions of this research along with personal reflections.

Chapter Two – Methods and methodology

2.1 Introduction

In this chapter, I will describe the combinations of techniques and research methods used to investigate the organisation problem that is being studied in this thesis. In doing so, I will elaborate on why action research was chosen as the method of research and why it would work in this situation. Most importantly, the structure and the design of the research project and the layout of the research cycles will be explained.

2.2 The overarching research question

While stating the research scope in chapter one; the overarching research question that is being investigated in this study was declared. It inquires, "**what strategies could Princeton Pragmatics and its IT consultant partners pursue in response to emerging trends in the adoption of automation and AI technologies?**". This overarching question has been further decomposed into eight sub-questions during the pre-stage research, which influenced the data collection.

Q1. What is expected to change in the next 5-10 years in the way white-collar human workers do their jobs?

Q2. In what ways Princeton Pragmatics can change its strategy or operating model so that it can facilitate necessary learning and adaptation to IT consultants?

Q3. What are the implications of the issue to the consulting work environment, team dynamics and leadership in organisations when AI and machines work together?

Q4. What kind of strategies or skills need to be developed so that the IT consultants can find revenue streams in the future?

Q5. What kind of AI and automation capabilities can keep human workers away from employment?

Q6. Can AI and automation benefit the labour market?

Q7. What type of AI or automation technologies, when, and under which conditions, can pose risks to consulting jobs or the society served by the IT consultants?

Q8. What actions can IT consultants take to become unaffected by the consequences?

2.3 Philosophical assumptions which influenced the choice of research method

When it comes to interpreting reality, my ontological assumptions help me to understand the nature of truth claims. I do believe that some amount of commonly applicable, but obscure truth exists, as a result, how I interpret truth is very much in line with *'Internal Realism'* (Easterby-Smith et al., 2012, p.19). Internal realism is an ontological position which assumes that there is a single reality, and it asserts that this single reality is impossible to be accessed directly by the scientists. The best example given by Easterby-Smith et al. (2012) is the approach used by scientists to analyse the behaviour of sub-atomic particles. What I believe about the truth we find in management research is very similar. However, I believe that the facts about the research problem can depend on the viewpoints of the one who observes it. Therefore, my ontological position about the facts is identical to *'Relativism'* (Easterby-Smith et al., 2012, p.19). The assumptions of Relativism state that *'scientific theories are not simply out there to be discovered'* (Easterby-Smith et al., 2012, p.19). Instead, people who have a past reputation create them and gain acceptance. Hence the truth about the matter being investigated should be agreed upon by the *'main protagonists'* (Easterby-Smith et al., 2012, p.19). Since I think facts related to the issues can be at times very subjective, my approach to the inquiry or the process of knowledge creation will be very much influenced by a *'Social Constructionism'* (Easterby-Smith et al., 2012, p.23) based epistemological position.

2.4 Appropriateness of Action Research as study methodology

The selection of an appropriate research methodology for this DBA thesis was made during the thesis proposal stage. When the research problem was identified, it was understood that analysing numbers may not lead to the expected results towards solving the issue. It was not much difficult to understand that the use of a qualitative research methodology would be appropriate as most qualitative research methodologies are ideally suited to understand lived experiences of people. Since it is hard to provide a definitive criterion to validate qualitative research, it was prudent to adhere to one of the well understood five qualitative research methodologies (Creswell, 2013) that are known to most scholars. Out of these five methodologies, 'Action Research' and 'Phenomenological Research' appeared to be viable two approaches to consider. Phenomenological Research methodology came to my attention because

it would be more appropriate to understand the lived experience of a group of individuals experiencing a particular phenomenon. The rapid adoption of AI and automation is such a phenomenon. However, in this case, simply understanding the lived experience of people is not sufficient [participants need to do something about it]. Gaining a mere understanding of the phenomenon lacks any strategic management benefit to Princeton Pragmatics [since the research methodology does not give that much prominence to action] as a company or to the individuals who rely on that company to find work projects. When evaluating the appropriateness of action research over phenomenological research in this regard, several reasons prompted that the action research would be more appropriate.

Action research methodology inherently requires participation and taking actions while doing research (Greenwood and Levin, 2007, p.7). Therefore, the use of action research will not raise the issue of whether the research would allow taking strategic actions and evaluating them. Since the detection of the research problem to this date, the emerging phenomenon and its understanding have been changing. Churchman (1967) described such problems as *'wicked problems'* that need to be addressed differently than solving common puzzles. Since this research problem is similar to those wicked problems that change when interventions are done, it requires an approach that would rely on learning-in-action [as the problem is likely to change when the participants take actions], which helps understand and navigate while being a participant of the real-world problem. My epistemological assumptions influenced by *'Social Constructionism'* also makes it a strong case to use socially constructed facts to make decisions about the ongoing issue. Action research methodology would allow me to become a participant who works in a democratic manner with other peers and take action while doing the research instead of other traditional research methods. Hence, I believe that action research is a much appropriate research methodology with a higher likelihood of success in this research.

2.5 My role as a scholarly practitioner in this research

As I start this research, I have multiple roles as a participant. As a practitioner, I own a company whose organisation issue is being investigated. Secondly, I have a role as an IT consultant or an IT professional. I have the primary scholarly researchers' responsibility in this study in addition to these dual practitioner roles. Since this research is done to support my doctoral thesis, I will be the research owner. Designing and planning this research will completely be my responsibility.

Conducting scholarly research requires certain standards to be maintained related to the quality of work being delivered in the thesis, which is free from biases occurring due to pre-understanding. While being the researcher, I worked as a peer-participant in the process of inquiry, taking actions with the other participants. Hence, being aware of the role duality, the vulnerabilities of pre-understanding, I tried to avoid the 'dilemmas and tugs' between my established organisational role in Princeton Pragmatics, among external client relationships and the primary researcher role. In this regard, I asked myself the two questions Coghlan and Brannick (2014) recommended. That is, 'How do you build on the closeness that you have to the organization and maintain distance?' and 'How do you balance the potential dilemmas and tugs between your established organizational roles and your researcher role?' (Ibid, 2014, p.133).

Furthermore, Bjorkman and Sundgren (2005) informed me that a researcher who is an insider having access to the insider knowledge [pre-understanding] has the disadvantage of being biased of believing that he or she knows answers to all the questions. I was cautious about not allowing such biases during my involvement in the research to conceal my ability to gain access to the perspectives of others. In other words, when others said what I did not want to hear, I appreciated that.

2.6 Design of the Action Research

This action research will be designed as logically organised intervention cycles mapped against different research milestones. The research activity is going to continue beyond the scope of this thesis. However, in this section, I will be describing only the intervention cycles that will fall within the scope of the thesis.

2.6.1 Creating learning arenas

According to Greenwood and Levin (2007), action research necessarily contains three components called 'action', 'research' and 'participation' (Greenwood and Levin, 2007, p.7). Therefore, an action requires forming suitable arenas for conducting research for co-creating new knowledge with other participants. Therefore, I teamed a group of individuals from the practice environment who engage voluntarily to create an action research knowledge creation arena. This arena is an asynchronous online collaborative group who exchange their ideas using the Google

Groups email-based collaboration platform. Google Groups is a free service provided by the famous internet service provider, Google.com. Hereafter in this thesis, I would identify this learning arena as the "**Collaborative Action Research Group**".

The Collaborative Action Research Group consists of six individuals, including myself. All six individuals have over 15 years of career experience as IT professionals. These associates were chosen from the Princeton Pragmatics' contact list with the criteria that they do not receive any payments from Princeton Pragmatics and not belonging to a vulnerable group of individuals such as temporary work VISA holders working in the USA as IT consultants. Most importantly, the other five participants had to be willing to provide their participation within the research group for several months. They all know about the business context and the type of work done by Princeton Pragmatics. It enabled the participants to be very productive contributors in the research. During the establishment of the Collaborative Action Research Group, each participant was given a participant information sheet (PIF), and a Participant Consent. The PIF described how exactly the participant would collaborate in this research group. At the inception of this learning arena, I familiarised the participants on the approach to ask the right questions in the way recommended by Marquardt (2007). I also explained the art of reflexivity, which is well explained by Antonacopoulou (2004). Once this initial familiarisation of the norms of participation, the collaborative research group was considered operational.

Since the interaction in the collaborative action research group spanned several months, the relationship between the participants and the primary researcher has to happen in the most productive way possible to benefit the research. At the time of the design, I looked at the best approach to get things done in this research group. I noticed the claim of Björkman and Sundgren (2005) that political behaviour is relevant in getting things done in 'your way' (Ibid, 2005, p.402) and its direct relationship to power. As per Mechanic (1962), 'Power is seen as resulting from access to and control over persons, information, and instrumentalities' (Ibid, 1962, p.349). Formal power available through organisational structures and authority and informal power gained through access to knowledge are at the disposal of the participants of the research (Ibid, 1962). However, this perspective on political entrepreneurship in research (Björkman and Sundgren, 2005) was mainly used in the context of a researcher gaining access to an organisation with formal power structures and with others who have informal power gained through

knowledge. In my situation, I owned the practice. Nevertheless, seeking formal authority was futile as any attempt to use that would beat the purpose of democratic participation and maintaining the absence of coercion during the research [I have an ethical obligation]. These individuals in my research group are people with whom I had many years of professional relationship. They committed to a longer duration due to the value they see about a trustworthy relationship with me. From Hilsen (2006), I learnt how ethics and politics are interwoven and how researchers have become responsible in that regard. Also, any absence of trust could be an ontologically impossible state for the research (Ibid, 2006, p.28). Therefore, as the researcher, I did not want to risk attempting to use formal or informal power and risk tarnishing my hardly earned trust with them. That trust is very important to do my practice beyond the thesis. My conscience had zero tolerance to negotiate on that with me.

The second learning arena is the interview arena which facilitated data collection during a subsequent action research cycle. Based on what initial inquiry within the collaborative action research group revealed about various problem areas, more details have been added to the overarching research question. This process of re-elaborating the problem definition and the research questions revealed many unknowns about the problem. As a result, I selected a group of participants closer to about twenty to provide input via research interviews or answers to written interview questionnaires. The interview questions attempt to understand and validate the findings during the problematizing research cycle and to gather knowledge to synthesise towards generating actions to navigate through the problem.

2.6.2 Research Project Structure

The scholarly research was done using the action research method, which typically involves two concurrent research activities. I would participate in participatory activities in an iterative manner, while similar activity cycles could be conducted to ensure how the research itself is progressing. It is a meta-learning process carried out through reflection on reflections (Coghlan and Brannick, 2014, p.13). The two parallel research activities lead to knowledge that has axiological importance to two different types of stakeholders. Therefore, Zuber-Skerritt and Perry (2002) propose using two parallel projects which feed knowledge to each other called *'**core action research project**'* and the *'**thesis action research project**'*.

The core action research project is responsible for doing research by taking actions in the problem environment. In contrast, the thesis action research project involves conducting an action research cycle about the action research. The illustration in Figure 1.0 depicts the activities that will occur in the core and thesis projects of this research. The direction of arrows shows the activity flow must happen iteratively, transferring knowledge between the two projects.

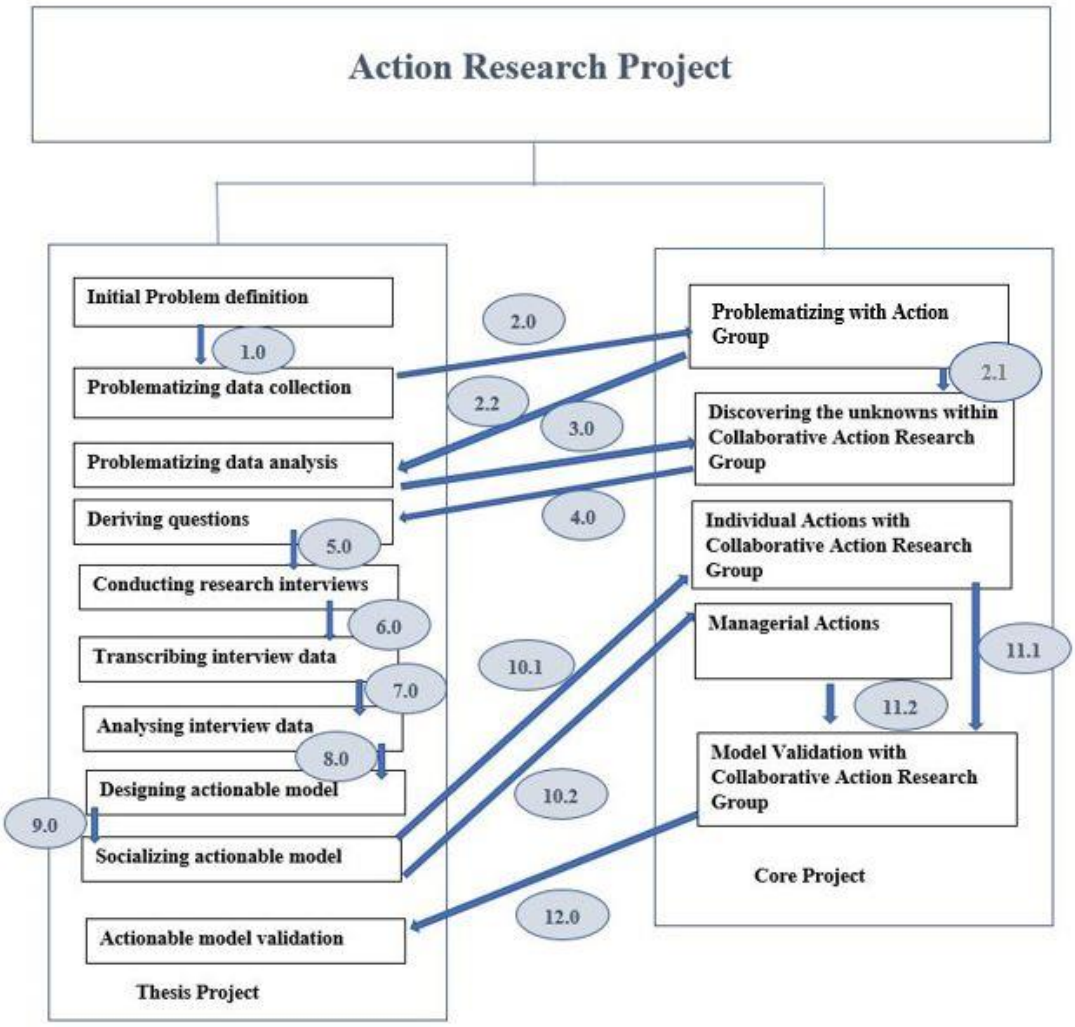

Figure 1.0 two concurrent projects to manage the action research.

2.6.3 Design of the Action Research cycles

The research's empirical stage consists of four research cycles operating in a Dionysian approach (Coghlan and Brannick, 2014, p.12) arrangement of action research cycles. In this approach, some action research cycles occur concurrently. Figure 2.0 illustrates this alignment of the action research cycles. Each of these cycles has corresponding similar steps occurring in both core and thesis projects. The first of those generic steps is the '**Constructing**' step, usually a dialogic activity between the participants. Depending on what research cycle it is, the dialogic activity would involve understanding what the issues are [pertaining to the research cycle], and on what basis the actions can be planned (Coghlan and Brannick, 2014, p.12). The second step would be the '**Planning Actions**' involving the planning of the actions pertaining to the actions which have to be taken during the ongoing research cycle. Once planned, as the third step, '**Taking Actions'** could be done. Finally, the **'Evaluating Actions'** step could occur. In parallel to the research activity, I have maintained auditing related to the work done, which helped to document the learning-in-action that could be later validated. Upon validation, the next action research cycle in the sequence can be executed. As Figure 2.0 shows, the problematizing, data analysis and validation action research cycles must happen sequentially. Throughout the duration of the entire three cycles [cycle one, cycle three and cycle four] mentioned above, the data-collection research cycle [cycle two] must continue in parallel.

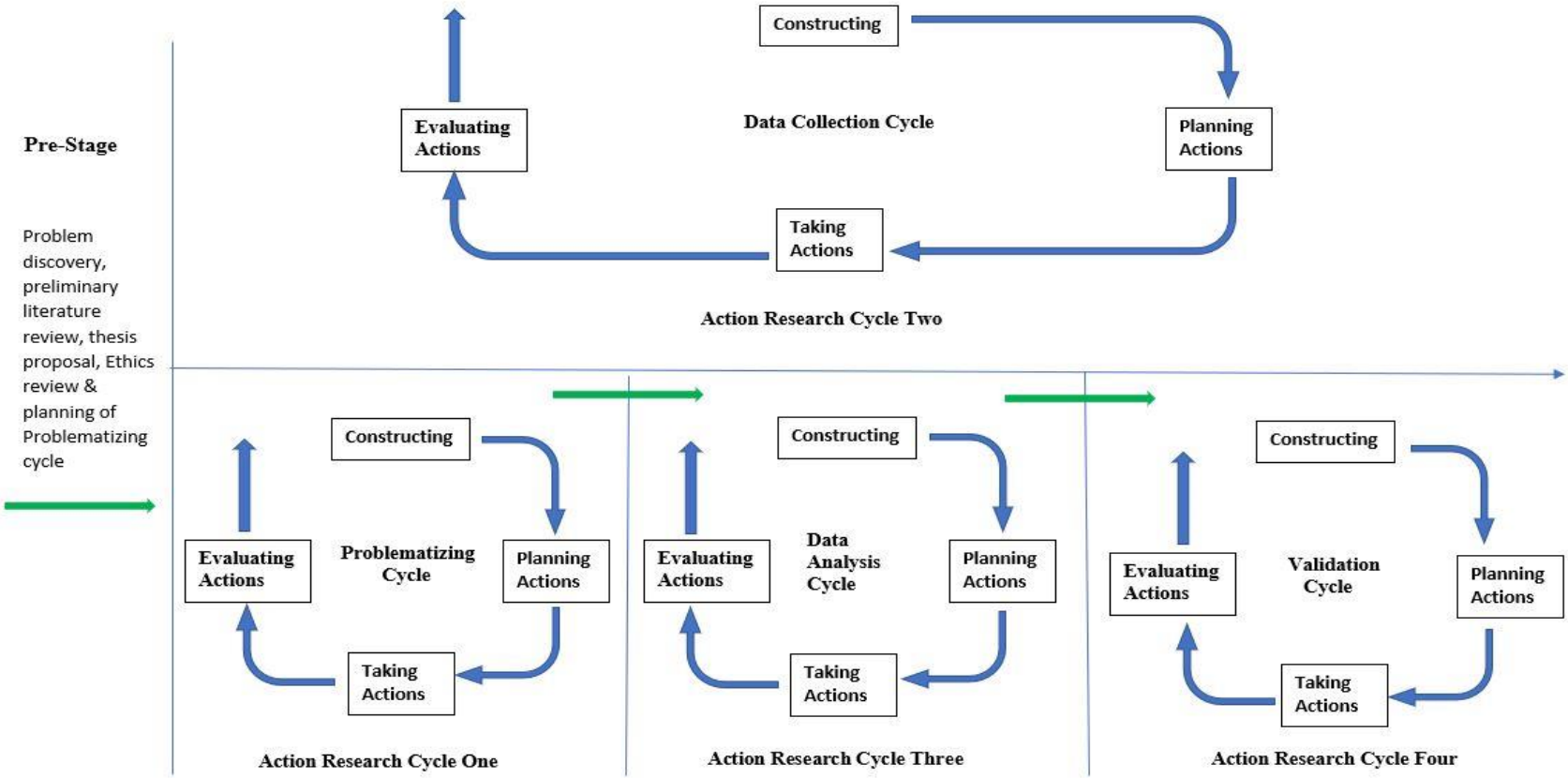

Figure 2.0 design of the action research cycles.

2.6.3.1 Pre-Stage of the Action Research

It took about 4-5 months of activity to complete the pre-stage of this action research. During the pre-stage, all the understandings about the problem under study were developed solely with my personal perspective. It was necessary that I, as the primary researcher, attempt to articulate the initial statement of the problem and gain an understanding of what may be necessary to be carried out during the research. Also, it was necessary to select an appropriate research method and come up with a design for the research while ensuring that it follows the research ethics guidelines of the University of Liverpool. During this pre-stage, the thesis proposal, and the research ethics application was submitted to the University of Liverpool research ethics committee for the approval. During that process, it was necessary to fully elaborate the strategy used for creating the learning arenas, determining the multiple methods through which data can be collected. I had to answer questions on what kind of stakeholders or participants can be involved during problematizing activity? What sort of data collection methods can be used? And what sort of data could be collected?

2.6.3.2 Cycle One - Problematizing cycle

As the first step of creating the collaborative action research group arena, I created a private email collaboration group in "**Google Groups**", an internet-based collaboration platform hosted by Google, Inc. Then, for everyone who provided the consent to participate in this arena, I initiated a Google group participation request which was delivered to them via the email addresses which have been provided to me by the participants. Once, all the participants reviewed Google's privacy policy and accepted the group participation, the activities of the problematizing started. Since the other participants had zero knowledge about action learning or action research, except for one individual who participated in a Critical Action Learning group with me in the past, I had to familiarise them with the norms of participation. Once these familiarisations were completed, I socialised the initial problem description, which I came up during the thesis proposal stage with the group members. Then discussions continued in the form of email threads in which an email subject was used as the title of the topic. The email thread continued until no new ideas got generated related to the threads. Lack of follow-up replies towards the end of the conversations was also another signal that the participants had expressed

everything they had to tell about the problem. The entire problematizing email thread was taken into one document and loaded into a qualitative analysis project in MAXQDA tool. As the output of this cycle, the research problem was redefined using the socially constructed view within the group.

2.6.3.3 Cycle Two – Data collection cycle

The data collection is an activity which started after the problematizing cycle and then continued towards the last research cycle, which is the Validation Cycle. As a result, the Data Collection cycle can be considered as a parallel cycle to the rest of the three cycles [Please see Figure 2.0]. Depending on which activity is the current research cycle within the other parallel chain of research cycles [cycle-1, cycle-3, and cycle-4], the arena and the method of data collection changes. In section 2.6.3.2, which explains the data collection activity happened while the problematizing cycle was in progress. Soon after the problematizing cycle completed, the activity in this research cycle focused on generating the most time and resource-consuming data collection activity. It required conducting recorded research interviews with a set of individuals sampled from the professional contact list of Princeton Pragmatics, Inc, conducted via video conferencing done using Skype. A lot more time was used to transcribe video conversations. The MAXQDA tool had a video scrolling and playback feature, which was helpful to get a relatively complete transcription done. In addition to interview data, scholarly literature from the seven most highly ranked management research journals were collected. Finally, during the model validation cycle, the data collection focus was again moved to the collaborative action research group, in which the reflection on the actionable model was collected from the discussion email threads.

2.6.3.4 Cycle Three – Data analysis cycle

During the problematizing work as well as model validation, data analysis was involved. However, this research cycle was all about analysing the mammoth content of video recordings created; because of conducting the research interviews via video conferencing. The data analysis attempted first to validate the understanding from the problematizing analysis and then to look for insights towards generating actions [to mainly influence the design of the actionable model].

The process followed in this task is briefly described under section 2.9.2. At the completion of the data analysis, I looked back in the form of reflection to see if that answered all my questions or it left any questions unanswered. I found that multiple participants discussed themes relating to the attitudes of an experienced workforce. However, none of them could bring the necessary clarity into those themes, which was a gap in understanding. Therefore, as the next step, a comprehensive literature review was conducted. The literature was then coded using a new qualitative analysis project. Coding and analysis of the literature followed a very similar approach to the analysis of interview data. However, the literature review's primary focus was to understand better about changing the professionals' attitude. Therefore, a different coding hierarchy was used in this process. It was possible to construct an actionable model to help IT consultants and IT professionals take actions using the interview data analysis and the literature review.

2.6.3.5 Cycle Four – Validation cycle

The fourth and the final action research cycle, which falls within the scope of this thesis is the validation cycle. What is being validated here is the actionable model. The actionable model derived from the analysis is somewhat generic so that anyone can customise it for their own needs. Since an engine is something which produces an output, the actionable model can be treated as an engine of actions, but not as the concrete actions. Manufacturing engines have moulds which can build products. The moulds that are associated with the actionable model are the recommended enactment process and the heuristic devices which can shape how IT consultants and IT professionals make career decisions in relation to the emerging problem. The actionable model is supposed to be a continuously improving, changeable and adaptive solution which is supposed to learn using a 'double-loop learning' (Argyris, 2002) approach. The participants of the collaborative action research group spent about fourteen weeks to evaluate and reflect on the usability and necessary amendments to this model, during this cycle. The end product of this effort is an improved actionable model.

2.7 Scholar-Practitioner's reflexivity

Reflexivity is a much-debated topic among researchers of many disciplines, according to Cunliffe (2004). In my effort to understand critical reflexivity, I found many interpretations of it taken from many different angles. To describe how I applied critical reflexivity throughout my research, I would like to use Ann Cunliffe's interpretation of this concept. According to her, reflexivity means *'examining critically the assumptions underlying our actions, the impact of those actions, and from a broader perspective, what passes as good management practice'* (Ibid, 2004, p.407). In so doing, the researcher would focus on three issues, namely 'existential' [who am I and what I want to become?], 'relational' [how do I relate to others?], and 'praxis' [need for self-conscious ethical actions]. Cunliffe (2004) recommends using reflex interactions, reflective analysis and reflexive questioning to develop critical reflexivity skills. Also, she states that journaling can help achieve that to a great extent during research.

I conducted a monthly audit review of the progress within each research cycle using a research journal. The journal is structured into monthly logs. The research journal for any given month would capture a summary of research activities, assumptions made, recommendations made, action items for the next month activity, validation criteria for the actions and reflexivity using **ORJI** [**O**bservation, **R**eaction, **J**udgement, and **I**ntervention] framework (Coghlan and Brannick, 2014). I find the ORJI framework an excellent way to orchestrate this reflexivity technique which Cunliffe (2004) described. I found that whenever I react to observations made during the research, it happens in a passive manner without me even noticing it. When I journal these observations and reactions and then apply judgement on them, it forces me to analyse the assumptions under which reaction occurred [as reflex] and that very reflexive action itself. On most occasions, judgement led to different conclusions. As a result, it made me take different actions as interventions. During each month, the reflections collected into the audit log was presented to the research supervisor.

2.8 Supporting enactment by design

As it was described in section 2.6.3.5, the main product of the data analysis cycle and that of this research is the actionable model, which can be considered as an engine of actions. Throughout the research [like in any action research], as the researcher, I must take many actions with other

participants. But, the focus of this actionable model design is to facilitate detection, selection and implementation of individual participant's actions for the sake of navigating through the problem being studied. Therefore, this thesis research strongly supports the enactment by its design. Once the model is in place, its validation process ensures that the model helps individuals generate actions as designed.

2.9 Data collection method

The primary data collected in this research is qualitative. Easterby-Smith et al. (2012) describe many sampling techniques quite popularly used in quantitative data collection. This research did not intend to do quantitative analysis based on responses but value the relevance of the qualitative data being collected. Hence, it was necessary to rely on non-probabilistic methods to decide on the sample of participants. Although *'snowballing'* (Easterby-Smith et al., 2012, p.229) was considered to find the individuals who might have the higher likelihood of having the knowledge to respond effectively on the problem, the ethical need to have the participants be anonymous prompted to select other methods. It was necessary that the participants have knowledge about the business context of Princeton Pragmatics; as a result, relying on the contact list of the company containing about five hundred individuals was borrowed from *'Convenience Sampling'* (Easterby-Smith et al., 2012, p.229). However, the sampling design focused more on increasing the representation of different participant categories from the stakeholders; as a result, deciding on who would be the selected subset of participants was more influenced by the *'Quota Sampling'* (Easterby-Smith et al., 2012, p.228) technique. It was ensured that some participation from the following three categories of stakeholders listed in Table 1.0 would happen.

Stakeholder Category	Stakeholder Subcategory
Peer IT consultants	IT consultants who develop automated solutions
	IT consultants who had an impact on career due to Automation and AI
Existing and Potential Clients	Managers who make decisions on the workforce
	Technology Leaders who propose Automation
	The human workforce who experienced the phenomenon
AI Experts	Technology Scholars/practitioners who Invent AI and Automation methods
	Practitioners who apply automation/AI

Table 1.0 Categories of potential participants for qualitative data sampling.

For this research, I designed two learning arenas. Collection of data within the collaborative action research group is a prolonged activity. The data collected from the interviews relatively required a shorter time commitment. Division of the initial sampling space into the two categories involved using an elimination criterion like what would be used in *'purposive sampling'* (Easterby-Smith et al., 2012, p.228). In fact, the potential participants were asked if they will be able to commit to 18 months in the research before deciding whether they can participate in the collaborative research group.

2.9.1 Data collection within the collaborative action research group

The collaborative action research group participants agreed to maintain confidentiality and make sense within the group by responding to email threads for eighteen months. They can mask their names when communicating in the arena via emails. The email group is only accessible to the group members. The members agree not to share the information to outsiders. As the action research coordinator, I extract the information and anonymise the content before conducting any analysis. The data collected in this group is open-ended. It does not have any structure. It followed the democratic participation of individuals providing reflexive critiques of the topics being described. Data generated in the group is not extracted for analysis as they arrive. As the coordinator, I let the information to freely exchange until the ideas become saturated. That

decision is based on my personal judgement. Then I extracted the data, anonymised it and continued to the coding and analysis.

2.9.2 Data collection from the interview participants

Data collection from the interview participants started only after the analysis of the problematizing data was completed. At the end of the problematizing cycle, I had three outputs; the first output was the renewed definition of the research problem. The second is the coding system. Most importantly, a collection of 46 open-ended questions [generated with the help of the collaborative research group] resulted from elaborating the eight sub-research questions emanated from the overarching research question. About twenty potential candidates were contacted with the consent form and the participation information sheet, and as soon as consent is received, a 90-minute video conference interview via skype was scheduled. Then with the permission of the participants, the conversations were recorded using the recording feature available on skype. The 46 questions were just guidelines to open up a conversation, ensuring that the overall themes are covered. During questioning, I used spontaneously generated questions while adopting a technique which Easterby-Smith et al. (2012) described as *'Laddering'* (Easterby-Smith et al., 2012, p.129). To understand the roots of an individual's perspective, I used laddering-up questions in a reflexive manner. When I wanted to dig deeper into a claim, I laddered down, asking for specific examples and other details. Using the MAX QDA tool's video scrolling feature, I manually transcribed each interview. Transcript creation for completed interviews and conducting other interviews happened in parallel. As a result, coding could begin for the transcripts for which the final confirmation from the participant was received while the rest of the interviews are conducted. Since the data collection cycle and data analysis cycle were concurrent, it was possible to use the learning from the data analysis to be used to determine that data collection had become saturated. Around the time when the fifteenth interviewer's transcript was analysed using the coding mechanism, it was evident that no new themes and powerful quotes were emerging. For the sake of completeness, all the seventeen transcripts were coded and analysed.

2.10 Data analysis method

The primary substance to be analysed in this research is qualitative data, and the analysis was done using a combination of thematic and content analysis that is inductive and emergent. Every single piece of textual data collected was used for line-by-line coding. Initially, coding started with *'open coding'* (Holton et al., 2011, p.13), which involved gradually developing a hierarchy of codes while associating them through relevant quotes. When the coding system naturally evolves and more dominant themes emerged, more *'selective coding'* (Holton et al., 2011, p.19) was done. Deciding on the codes to be used and the line-by-line analysis of the data was done as a manual process. However, I used a software qualitative data analysis tool called MAXQDA (VERBI Software, 2019), which allowed me to better manage the coding process. During each analysis stage, [during different action research cycles], manual coding was followed using the MAXMAP reporting tool, which illustrated the graphical coding map created based on the co-occurring codes. Max map illustrates the dominant relationships between codes based on the frequency of occurrence. The insights from MAXMAPs served the purpose of detecting relationships; however, the meaning-making happened only when the content analysis was done in relevance to the thematic analysis using the corresponding coding map [exported co-occurring coding map from MAXQDA]. This was necessary because the MAXMAP is an automatically rendered graphical illustration [report] based on frequencies of co-occurring codes. When prominent relationships emerge between codes, it was always necessary to go back to the quotes leading to that relationship using the quote map. Only then, the contextually relevant meaning from those relationships of codes could be derived.

2.10.1 Data analysis during the problematizing cycle

The data collected as a single document containing the entire problematizing discussion was analysed within a MAXQDA data analysis project using the approach described in section 2.10. During this initial coding process, open coding was more dominant as that is when the coding system started evolving. The analysis mainly focused on understanding the problem rather than finding solutions to the problem. Chapter 3 of this thesis describes the data analysis process followed during this cycle, and hence the detail of the analysis will not be described in this

section. At the completion of this analysis, the coding system was very much saturated with a focus on the problem.

2.10.2 Analysis of the interview data

The data analysis interview data was carried out in a different analysis project in the MAXQDA qualitative analysis tool. However, at this stage, the project re-used a matured hierarchy of codes borrowed from the problematizing cycle, which was later enriched by selective coding. Nevertheless, I was cautious to ensure that the scope of coding in this stage needed to look for finding opportunities to discover possible actions. Some additional open coding was necessary in this regard. Before analysis could begin, each participant was delivered with a copy of the transcribed conversation in the form of a password protected word document attachment. The password was communicated to the individual via phone. Upon receipt of the attachment, the corresponding participant reviewed the transcript for the accuracy. The accuracy confirmed seventeen transcripts were coded in isolation against the coding system in the same data analysis project. Deciding the type of code and the location in the coding hierarchy and attaching codes to the quotes within each document was done as a manual process based on personal judgement. As described in section 2.8, the thematic and content analysis was conducted. The process followed in this cycle and the findings of the analysis are listed in chapter four of this thesis.

2.10.3 Post analysis literature review

The findings from data analysis left some gaps in understanding some of the behavioural issues which no individual could accurately explain. The interviews helped to recognise the issue, but it was necessary to use the scholarly research published in the highest-ranking management research journals as a third voice to fill this gap in understanding. Unlike the analysis of the primary data, the search for knowledge was very focused on behavioural aspects of experienced professionals. Hence, a completely new coding system was developed in a fresh qualitative analysis project in MAXQDA. An in-depth description of this process and the outcome of the analysis will be described in chapter 5 of this thesis.

2.11 Meeting the research ethics obligations

Conducting doctoral thesis research at the University of Liverpool demands the researcher to adhere to the ethical norms of doing academic research. The preliminary stage of the research required that I go through the acceptance of the thesis proposal stage and then an ethics review stage. When designing the research to comply with these requirements, I explored some information available on the ethical guidelines (Smith et al., 2004; School of Education, 2016) of doing academic research. It was noted that most of the ethical concerns associated with the research of this calibre are related to the data collection. The eleven principles related to the ethics described in Bell and Bryman (2007) has been extremely helpful during the design of the research. Furthermore, exploring the types of ethical issues that may arise, I understood that *'type 2'* errors sometimes occur in research which may be interpreted as research fraud (Fanelli, 2009; Khaled, 2014). Therefore, my goal during the design of the research was to avoid ethical issues at any cost. Especially when handling the participants, I used the information provided by Coghlan and Brannick (2014) on the three ethical questions which Williamson and Proser (2002) suggested and the guidelines of Gellerman et al. (1990).

Particularly during data collection, I ensured that I follow the standard norms in scholarly research concerning gaining access, the anonymity of participation, and voluntary participation. This research did not involve interventions within organisations outside of Princeton Pragmatics; thus, it did not require gaining access to other institutions. Data collected in the collaborative action research group and from the interviews were immediately anonymised. No one other than me [the researcher] had access to the raw data. When it was necessary to distinguish quotes from the individuals, alias names [alias names have no relationship to the actual individual's name] were used to tag each quote from individuals. When communicating the details of the participation, each participant was educated on voluntary participation and their ability to withdraw from the research, including all the other rights. Participants were explained their right to refrain from responding to any question if they are not willing to do so. Also, each participant was given access to the information that can be used for dispute resolution if that may arise.

2.12 Next steps

As the research design came to a completion, and the approval to proceed with the empirical stage was received, I formally established the activity within the collaborative action research group. The first action research cycle, which is called problematizing research cycle, was initiated within this research group. As a result, I could present my initial statement of the research problem to the collaborative research group participants. With the collaboration of other participants of the group, I could further refine my understanding of the research problem. A detail elaboration of this activity can be found in the third chapter of this thesis.

Chapter Three – The problematizing action research cycle

3.1 Introduction

During the fall of 2019, I received the approval from the research ethics committee of the University of Liverpool, to continue with the empirical work of this research. Before this phase could begin, the perspective of the research problem was generated using my individual understanding of the problem enriched with some scholarly research and other third-party sources such as credible web sites available on the internet. The subject of the research matter is to deal with the effect of a phenomenon experienced by many people. As expected, each individual has different levels of experience related to the problem. Each one of them may not interpret the issue exactly the same way. Some of them could have increased awareness than that of mine, while others could have a relatively lower level of awareness. Depending on how much they know and the level of confidence they have, they are likely to understand differently. Appreciating the possibility of the diversity of ideas that can be available, I designed the first research cycle to produce a socially constructed view of the problem.

The group engaged in this commitment that they will remain to be anonymous during the publication of the research and anything that could be shared outside the research group should be anonymous. To ensure the anonymity without losing clarity, I would use alias names for each individual. I would name the other five individuals as Kalupahana, Desai, Krishna, Naren and Sid. Each one of them has a tremendous amount of experience in their professional career, and they have been selected from the contact list of Princeton Pragmatics.

3.2 Problematizing activity in the collaborative research group

The problematizing effort can be considered as a mini version of a combined data collection and analysis cycles. It is a mini version of that because the activity was done with fewer people using a completely different data collection technique. The scope of the problematizing effort was meant to improve the understanding of the problem and come up with a socially constructed view of the problem. In the first chapter, I described the problem as having to do with the emerging trend of the rapid adoption of artificial intelligence and automation in the workplace, which causes a lack of demand for human IT consultants. Since they lose the demand, my start-up consulting company had to find ways to help the IT consultants to remain marketable in this

changing market and re-align the company strategy accordingly. The first chapter of this thesis goes into a lot more detail of my initial definition, which captured only based on my observations while running the business. In response to this initial problem definition shared by me, multiple responses were made by four of the other participants. Krishna was unable to contribute to the discussions, but he was helpful in reviewing and providing feedback on my analysis.

During the research ethics committee's review of the design of this study, one of the questions raised was, how can I ensure that the collaborative research group participants do not say what I like to hear? Due to the personal relationships between them and me, they could tell what I would like to hear instead of telling what they want to tell. Due to this reason, I had an obligation to take special care to address that concern. Also, the most important thing about collaborating during the problematizing effort is to understand what other different perspectives than to mine exist. Finding out what overlaps and what discrepancies exist between those perspectives is another activity. At this stage of problematizing, understanding the perspectives of others was important to me. The reason being, when reviewing them, if I felt that the participants simply said what I wanted to hear, I had to continue doing further sensemaking in the research group while avoiding any mistakes that may have caused that kind of information saturation. Hence, I would very briefly document the perspective of each participant on the issues. Overall, each person had their own different perspective. In some areas, their ideas converged, while in other areas, their ideas diverged. When analysing the responses in the problematizing email thread, I could identify the fundamental stances of their approaches to describe the issue.

3.2.1 Kalupahana's Perspective

Kalupahana by no means is an IT consultant who allows to stagnating his skills in *'Jurassic technologies'*. But during his continuous challenge to remain in the market, he believes that there are factors that are relevant to artificial intelligence and automation as well as outside personal, social and economic factors that are fuelling the crisis. He thinks that very experienced technologists, due to their blind loyalty to their employers, make them vulnerable by being stuck with legacy technologies that are becoming outdated. It was his reflection that ignited the discussion about personal challenges surrounding the problem. He believes that *'for an IT consultant, specialisation in technology is the main reason to win contracts'*; and in a rapidly

changing landscape, it is a *'never ending challenge apart from many other challenges outside their control'*. The experienced IT consultants who are in that state have developed their expertise by accumulating traditional skills over the years. However, during that process, *'they become expensive while they gain experience and expertise in a particular technology'*. Due to this cost of labour, end beneficiaries of information technology demand introducing technologies that are aimed at reducing costs. When such decisions influence the changes in the technology landscape, *'there's little time to gain expertise'*. As a result, their existing skills go out of demand, and their ability to make the same bill-rate, as usual, becomes impossible. He further believes that the common rhetoric that *'AI and automation empowers the seasoned consultants'* does not manifest in the same way in practice. In his opinion, it *'dramatically remove consultants and replacing them with a different generation of new comers'* [this claim will be verified using triangulation during the data collection and analysis].

3.2.1 Desai's perspective

Desai's carefully structured responses in the research group do not either deny that the AI and the automated solutions have the potential to displace jobs. He stated that *'in general makes human resources more efficient and in turn reduces demand for human resources'*. He too believes that *'for working professional, it's not easy to adopt new changes (technologies/paradigm in this case) as it requires time & money and not to mention changing existing habits'*.

Although, Desai believes that *'in recent time pace of changes has been faster than seen before'*, it has the potential to create many opportunities despite *'historically, innovation has replaced one set of skills with another set of skills'*. Innovations in AI and automation can potentially create opportunities in areas which were never thought before [this claim deserves validation during the data collection phase]. The reflections made by him in the research group confirms the wide adoption in AI and automation. It seems to be the case with almost every sector while *'major value of AI would be in Scientific Research, Government decision making and services, Healthcare, Environmental science, Social media, Defence, Law enforcement, Communication and reducing time to innovate further in all areas'*.

3.2.1 Naren's perspective

Naren, after having completed his AI strategy course with MIT reflected in line with the same idea as the scholarly camp who believe that *'it is not different this time'* when it comes to the influence of AI. He claimed that *'it's not going to totally eliminate human effort'*. He also confirms the fact that *'with the enormous computing power, internet and loads of data available, new technologies and products are getting launched at a rapid pace'*. However, in his opinion, the change of technology cycles is every 5-7 years. This assumption about the renewal in the technology cycle requires validations because my personal experience about the technology cycles suggest that it is much faster. In response, I had to share my experience stating that the *'technologies used in the previous projects one year ago have been replaced by newer breed of technologies as a result of learning from the performance issues of the previous technologies'*. The two MIT professors Brynjolfsson and McAfee with whom Naren has spent several weeks have been two key authors whom I have cited during the first chapter of the thesis. Naren states that according to them, *'one cannot totally eliminate the decision making of a human mind'*. This claim leads me to include a research question to my data collection cycles questionnaire asking whether; is it necessary for a machine to be identical to a human in terms of all capabilities, to be able to take over major tasks carried out by humans?

3.2.1 Sid's perspective

Sid is a technologist who would dare to try any new technology as and when they arrive. However, the following claim is very alarming, and it seems to suggest a different trend than what Naren thought about the technology cycle. According to him, *'the biggest problems for us "humans" still at this game, is the problem of keeping up with rapidly evolving frameworks; it is now moving so fast, that even taking a three-month hiatus, might render someone a lot closer to unemployable'*. He believes that although there is a lot of noise in the industry about various new breeds of AI and automation species, the leading platform providers like Amazon and Google will win the race. While relying on his judgement, he has invested his time and energy in the Amazon cloud computing platform, which seems to provide the necessary computational power and the platform capabilities that can enable the evolution of AI faster. However, his experience with Amazon Web Services seems to send some warnings to those experienced IT consultants.

After having completed the Amazon Web Services certification last year, he still finds his life as a software engineer to be very challenging. His powerful question; *'after months of study and being overwhelmed with what seemed an endless number of separate AWS services… Amazon announces about 30 new services! Not including any changes to the existing mountain of services. How can one keep up?'* tells how rapidly the technology landscape is evolving. It is once again questionable that, if there is rapid adoption of AI in place, would not there be coding opportunities for developing AI? According to Sid's opinion, *'as keeping your skill relevant in terms of AI, though, keep in mind that relatively few developers utilizing AI will be involved in coding AI itself'*. He is a strong believer that companies like Amazon and Google will hire a limited number of people and produce platform solutions that everyone else will use. Sid's reflections in the research group reveal some idea about where he thinks the future landscape of technology will be. He says, *', in moving to the cloud, I'm finding less raw programming involved, but much more planning and configuration necessary'*. He reiterates the fate of the programming jobs in the near future, claiming that *'I think we're coming to the last days of a programmer sitting down and writing thousands of lines of logic'*. If it is true, that means lesser work will be available for software developers. It affects the demand for services offered by companies like Princeton Pragmatics. This opinion of Sid's needs validation, and as a result, several interview questions have been added to the question bank to be used during the data collection cycle.

Sid seems to be a believer that what would make it possible for the AI to achieve 'God' like capabilities are currently brewing up. He thinks that the success of quantum computing might take this technology towards that level. He stated that *'AI combined with quantum computing will be the force to be reckoned with. God-like abilities. Or as Elon Musk put it, "we're summoning the demon"'*. I could verify Elon Musk's claim from another third-party source where a clear recording of Elon's meeting at MIT was cited (Liu, 2014). Also, I could triangulate the claim about the availability of quantum computing at the moment. Amazon Web Services has an article that was published in December of 2019 that they offer quantum computing (Bar, 2019). Scholarly research published in 2017 related to ethics and information technology reveals that around that time, NASA had adopted quantum computing to their aerospace research (Möller & Vuik, 2017).

3.3 Method of analysis used during the problematizing cycle

All the information that was exchanged in the collaborative research group's email thread which was created for the problematizing exercise was extracted into one document. Then it was ensured that the document was anonymised and did not contain any contact email addresses or participant names. Some company names were available, but those company names are popular for their technology offerings, and their websites offered verifiable public information of their offerings. As a result, such public names were not eliminated from the text. Then the text was loaded into a qualitative data analysis tool called MAXQDA. The tool allows its user to organise a hierarchy of codes and associate them with various quotes selected from the content. As an initial step, I wanted to develop a basic set of themes as codes within my qualitative data analysis project within MAXQDA. I used the thesis proposal document and the first chapter of the thesis, which I had drafted before. These documents contain the initial problem definition and some of the information gathered from several scholarly publications and other sources [cited in the first chapter]. Using these two documents, I conducted an initial open coding of the research project. The tool allows the user to trace where the source of the quotes came from, and the coded segment analysis helped me to relate code, quotes and the source relationship. When it was about time to analyse the information gathered from the problematizing thread discussions from the collaborative research groups email forum, I started adding new themes [codes] that relate to the new knowledge which was co-generated by the group members. At the next stage, some selective coding was done on various themes as they appear to repeat more and more during discussions. Eventually, it was evident that the information generated from the problematizing thread seems to saturate around existing themes rather than new themes. The code repository showed that there are thirty-two main themes identified during the analysis. Several of these main themes introduced several sub-themes. The "Appendix A" section of this thesis provides several screenshots of the MAXQDA tool illustrating how this coding and analysis process was carried out.

To understand the relationships between the themes, I used a visual tool available within MAXQDA called MAXMaps. In that visual tool, the analysts can select which codes to be used for showing interrelationships. Since the two documents which were generated before was used to define the themes during open coding, I carefully included only the data collected from the

problematizing cycle to be used for generating the code diagram. That was because I wanted to analyse the renewed understanding of the problem achieved after the collaborative research activity. At first, when I loaded the themes to the diagram, even the themes which had minor attachments to the other themes were loaded, and it was hard to generate any meaning from it. As a result, I had to find a way to illustrate only the most relevant information, as shown in the diagram. After spending many hours finding a consistent way to do it, I could come up with a repeatable approach to generate the map effectively. I used a process of elimination criteria to do that. Below are the steps followed in that analytical approach.

(1) When generating the code map for the overall problem context, I gave prominence to the code, which represents the "IT consultant". It was done because the IT consultant is the unit of analysis of this research.
(2) If the code does not seem to relate to the problem but the solution, I deleted it from that particular code map diagram.
(3) If any code is less frequent, like the thinnest line in the diagram, and if I do not recall it relating strongly with the problematizing discussions, I deleted it from that particular code diagram.
(4) If the lines are thinner but relate to the global problem, rather than the local issues with Princeton Pragmatics, even if it is related to the problem, I deleted it from that particular code diagram.

I applied the above process to the overall problem context. The same process was then applied to generating several other subthemes which became prominent in the overall problem's code map. When I did the sub-level code maps, their relationships appeared much clearer without that much of details because it focused on a specific area of the problem. As an illustration, the overall problem's code map produced using the above-mentioned approach is depicted in Figure 3.0.

The code map contains several themes that have been associated by me with the content of the data, which was analysed. These themes (codes) show relationships marked with dashed lines connecting them. The thickness of the dashed lines increases if the analysed text revealed that the co-occurrences of these themes happen more frequently. More frequent co-occurrences give an indication that the interrelationships of those themes can be more relevant. This insight revealed from the thematic analysis must be confirmed by doing further analysis of the actual content.

Each of the related themes is tagged against a list of quotes [the content]. By reading and extracting the meanings out of the quotes allows the analyst to find the most probable reason for the relevance of the themes. For example, in the below code map, it can be seen that thick dashed lines are linking the themes “Rapid Adoption of AI”, ”Experienced Consultants”, “Challenges”, “Learning Difficulties”, “Job Matching”, “Traditional Skills”, “Marketability”. I then analysed the quotes associated with co-occurring themes. When necessary, several of other second-level and third-level code maps were created and analysed. For example, to analyse further on the theme of “Learning Difficulties” I constructed a code map for that theme, giving it the central focus. This way, it was possible to dig deeper into specific narrow areas to identify the details.

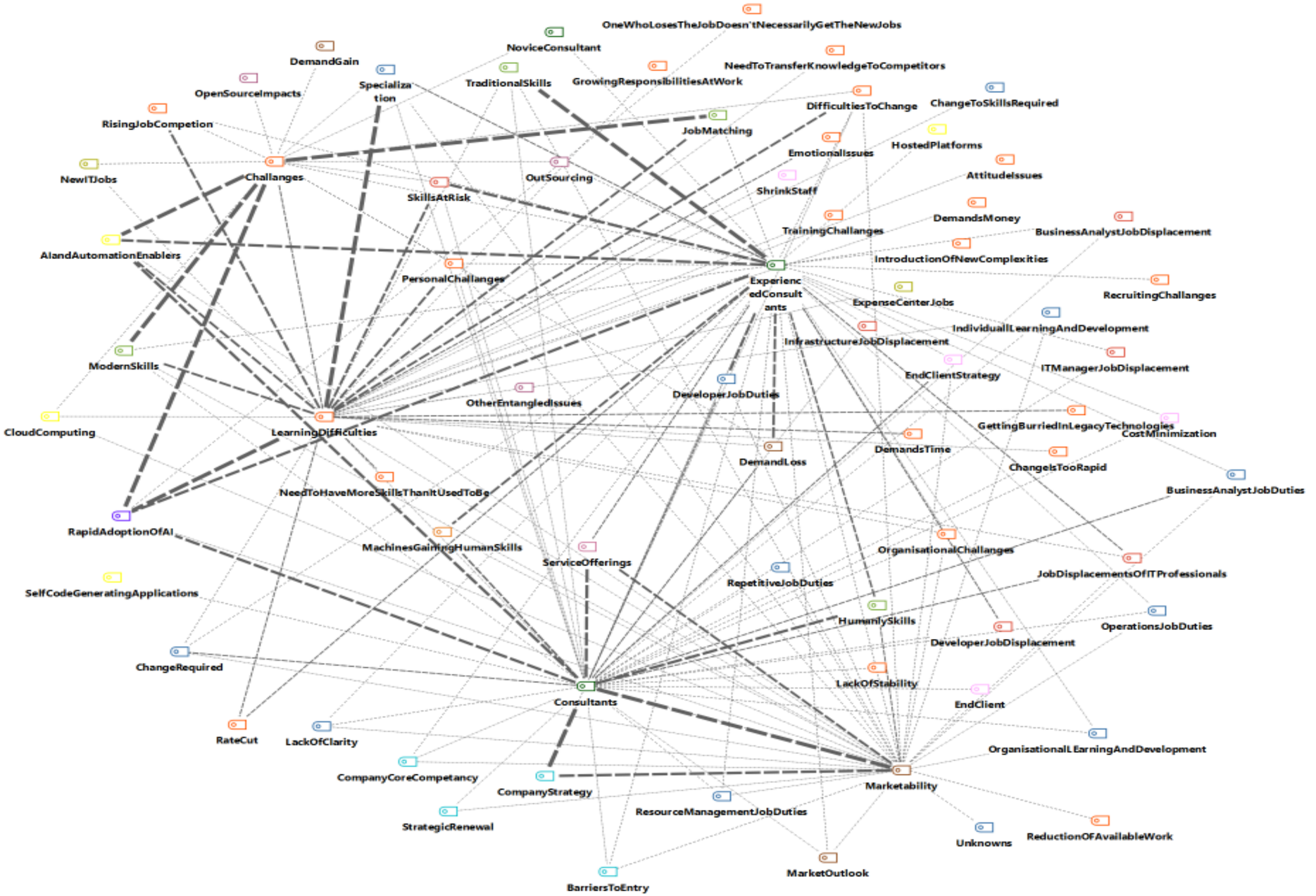

Figure 3.0 Code map depicting the relevant themes discovered related to the overall problem context.

3.4 A renewed understanding of the problem after co-creation of knowledge in the collaborative research group

Starting from the design of the thesis until the creation of the Collaborative Action Research group, any elaboration of the organisational issue under investigation was done only based on my individual perspective. It was enriched with input from scholarly literature, but it lacked contribution from other individuals who were either affected by the same phenomenon or know about the technology trends.

The collaborative effort done within the research group generated a reasonable number of reflections from six individuals who had contributed during the problematizing cycle. The qualitative analysis of the information led to many insights. As a result, earlier, what was understood by me as a multi-faceted problem that ubiquitously generates complexities in many directions could be modelled using visual artefacts. Figure 3.0 is one example of many codes relation diagrams that I created using the problematizing data with the help of the MAXQDA tool. When the code relations revealed more frequently occurring relations in darker lines in the diagram, I accessed the content, resulting in those relationships using a related co-occurring quotes map [see Appendix A]. While reading through the quotes, I tried to understand what conditions based on actions would put a person in a particular situation and lead to another situation [action logics]. In the beginning, it was hard to keep these action logics involved in various scenarios in my mind and focus. I felt that within the relationships that I discovered among the emerging themes found during data analysis, there seems to be a hidden message which I don't quite comprehend. That is when I realised that some amount of conceptual leap (Klag and Langley, 2013) might be necessary to understand this obscured meaning of the data. A conceptual leap in qualitative research would require *'seeing'* and *'articulating'* (Ibid,2013, p.150) these *'inextricably intertwined'* action logics. Therefore, the act of seeing would require acquiring new ways of making sense, according to Klag and Langley (2013). As a result, I used a business process modelling tool that was available to me to document various states and transitions as and when I discover them in the process of understanding the relationships between the quotes. When drawing the diagram, I wanted to keep the trends happening in the environment, trends occurring to individuals and the trends appearing to the organisations as separately as possible. At the same time, I attempted to illustrate the inter-relatedness between

these separate progressions of trends using dashed arrows. Ultimately, the drawing came out to be a very complex one. When taking managerial actions, I usually apply scenario analysis in my mind, similar to the way a player who participates in a strategic game does it. I did the same kind of scenario analysis in this situation. However, this time, my analysis was supported by the data analysis artefacts and the complex diagram I created. I have provided a screenshot of this complex diagram in Appendix B of this thesis for the purpose of illustration [To understand this process of scenario analysis, the reader does not need to understand this diagram in Appendix B]. When running each scenario in my mind, I re-instated someone else's [who would be an experienced IT consultant] position to myself and attempted to understand what might unfold due to me being in that situation, taking action, and some other possibility in that situation occurs. When I try to see that within the map, I discovered three different scenarios in which that person could be entangled in cyclic paths making it difficult to get out of the troublesome situation. I coloured these cyclic pathways in different colours. That way, I could distinguish different pathways. Iteratively repeating that process allowed me to discover three unique cycles that can aggravate the problem at a larger scale during each cycle, like a vicious cycle. At this stage, I understood that these three different pathways need not be mutually exclusive, which means that an individual can be entangled into more than one vicious cycle, simultaneously forming a complex scenario. Being able to separate the cycles would help the person to divide and conquer the complex scenario.

A vicious cycle is a cyclic occurrence of different states; one can be the predecessor to the other, like a chicken and an egg situation. Each state produces harsher realities each time it re-occurs, and the result of its occurrence leads to another state. Again, this new state produces harsher realities leading to the original state [some call it back to square one]. For example, one is unable to find a job because skills are getting outdated. Because one finds it challenging to generate income, finding money to invest in learning is hard. Since it is difficult to invest in learning, learning cannot be done, and the skills are further becoming outdated. This trend moves in a cycle which never ends. Such cycles form vicious cycles.

Even after the problematizing cycle, the initial understanding of the source of the issue still remains valid. That is the rapid adoption of artificial intelligence and modern automation empowered by modern capabilities, making it possible for the machines to acquire humanly

skills in a manner which was never imagined before. However, many statements made by the collaboration group members helped me to visualise how two other external trends; the geopolitical developments and the market trends have acted as a positive catalyst to magnify the issue. From the geopolitical front, it was revealed that in recent times, the government policies and vision have been discouraging the outsourcing of IT projects and hiring immigrant workers with immigration VISAs. The aforesaid two channels of finding IT professionals had kept the cost of technology under control for the benefiting companies, usually large corporations who hire information technology consultants. When the rising cost curve for these end beneficiaries of IT solutions turns upwards, their company strategies respond by finding alternatives to the expensive workforce. One of the research group members stated that *'they all had one common sin being expensive to the organization…'* and as a result *'their teams were infiltrated by newly hired cheaper resources; first as interns directed by their respective HR organizations, and lead initiatives to develop replacement solutions'*. As it was the case throughout history, when cheaper labour becomes scarce, companies turn towards automation. But this time, the trend of automation seemed to have been augmented with artificial intelligence.

Many capabilities have strengthened the performance of modern artificial intelligence and automation. As a result, many tasks which looked impossible to be automated have been delegated to machines. Cloud computing appears to be the front runner of reinforcing the AI capabilities by providing the computing power necessary to perform the same tasks, which could only be possible to be done by humans. One of the IT professionals who contributed to the Collaborative research group who had immediately attempted to gain knowledge about the cloud computing technology claimed about Amazon Web Services (AWS), a leading cloud computing platform service provider. After having done the developer certification for that provider, he believes that *'we're coming to the last days of a programmer sitting down and writing thousands of lines of logic'*. What this means to Princeton Pragmatics is that there will be fewer jobs requiring a programmer to write a lot of code.

On the other hand, hosted platform providers enable AI capabilities in their solutions, reducing the need for the benefiting companies to consume them as a service. Empowered with machine learning and deep learning, the "Big Data" is currently generating as many training scenarios as possible for the machines to learn. As a result, we see more human-like AI solutions being

introduced at the workplace. The capabilities which have been acquired by the humanoid robots seem to question whether the days are numbered for specific repetitive jobs held by human workers for a very long time.

While analysing the theme called “Challenges”, I used a specific code map which gave central focus to the challenges which revealed that “AI and Automation enablers” appear as a theme which more frequently co-occurs with challenges. Analysing the quotes related to the AI and Automation enablers, the claims made by the collaborative research group participants revealed that there had been multiple occurring themes related to the cloud computing ecosystems and their influence on modern AI and automation. When I created a new code map giving focus to cloud computing, it revealed that “Cloud Computing” co-occurs with “Rapid Adoption of AI”, ”Changes to Skill Required”, ”Specialisation” and “Modern Skills”. Cloud computing is a technology that was born within the last decade, and it became widely adopted within the last four years only. Unlike the past waves of technology innovation, the current AI and automation transformation emerged all of a sudden when cloud computing technology matured to provide enough power for complex computations. The expedited delivery of those platforms magnified the rapid adoption of AI and automation. With this ease of access, the adoption of these technologies has accelerated in many proportions. The rapid change introduced by this trend cause challenges on many fronts while it promises reduced costs. The immediate challenges are faced by those who are being substituted by these technologies. The end beneficiaries of these technologies have the incentive to adopt such technologies as they enable the shrinking of staff from various cost centres. According to one IT consultant, such initiatives targeting shrinking of staff, although might demand a different set of skills, ‘*opens up to a someone else who developed specialisation in the welcoming technology and it would be someone else bringing the new skill would get hired by the profit centre to reduce targeted cost centre’*. Due to the higher rates of experienced IT consultants, such staff shrinking effort impact experienced IT consultants. Having gained fifteen to thirty years of experience, they have accumulated a wide range of legacy technology skills that face an immediate risk of being replaced by a modern set of skills. At a rapid pace, such skills at risk lose in demand. If an IT professional’s current skill set loses demand, either that person has to change or face job displacement. Due to the emerging trend, it is common to see that the infrastructure-related jobs in IT operations being impacted by the job displacement trend. One IT consultant highlighted these types of jobs as being impacted by

saying that *'Impacted parties... 1) Laid-off workers of expense centres (mostly operational). Sometimes it can be in 100s in larger organisations. 2) Managers and senior operational staff of those targeted areas of operation'*. As highlighted by me in the middle of this sensemaking effort, a new breed of artificial intelligence capabilities called 'Self Coding Applications' (Grothaus,2018; Martineau, 2019) was identified. It was possible to immediately identify that these types of capabilities can potentially reduce the amount of work available to the software developers [even if they have modern skills], leading to a demand loss for hands-on coders. It means that the software developer jobs will no longer be immune from displacement. Basically, as a result of machines gaining several skills previously only possible to be owned by humans can lead to the elimination of repetitive tasks in the prevailing job roles.

The result of the skills losing demand and the job displacement tendency means that the change is inevitable for experienced IT professionals. The change would demand changes to the roles. Even if the role title does not change, it would demand a new set of modern skills for which they could achieve specialisation to remain marketable. As one IT consultant pointed out, *'specialisation in technology is the main reason to win contracts'*. The modern technology enablers can release things faster; as a result, those capabilities which can disrupt the industry emerge much faster. As rhetorically pointed out within the research group, the claim which stated that *'with the break neck speed of evolution with IT technologies and massive amount of newer service offers…'* speaks for itself of how rapid the emerging trend is imposing the demand to change on the IT consultants. This stimulus initiated from the external environment creates a vicious cycle generating responses for both individuals [IT consultants] and the organisation [Princeton Pragmatics].

By reading through the narratives of any individual in the collaborative research group or by constructing the thematic code maps alone could not reveal these vicious cycles, which I am going to unveil during the articulation of this novel understanding of the problem. The reason being the thematic maps are static constructs formed using the frequency of occurrences of themes. The thematic map does not produce a sequential ordering of the constructs. As a next step, I used the knowledge from the code maps and the insights from the quotes to depict in a very large logical diagram constructed using business process modelling graphical artefacts. The graphical artefacts represented states and connected arrows showing a direction of flow. It ended

up being a very complex and extremely large diagram that can only be viewed on a projected screen. The diagram had no logical start or a logical end. At any given point of time, any given individual can be dropped into a state and then that person can have several possible paths to move into next depending on the actions taken by that person. As a typical management activity which I always do, I involved in running scenarios in mind, looking at this problem model. Then I could recognise that there are three vicious cycles that one could fall into. I immediately shared the big pictorial view with the other collaborative research group members. An informal consensus was reached that I could separate the three vicious cycles and present to the reader. This was done because the original model was too detailed and too confusing to a first-time reader. The most damaging vicious cycle to the experienced IT consultants happens in this manner. When the demanded change is too rapid to be handled, it introduces several personal challenges which the experienced IT consultant has to deal with. Thus, I would name this vicious cycle as the '**vicious cycle caused by personal challenges**', which is depicted in Figure 4.0.

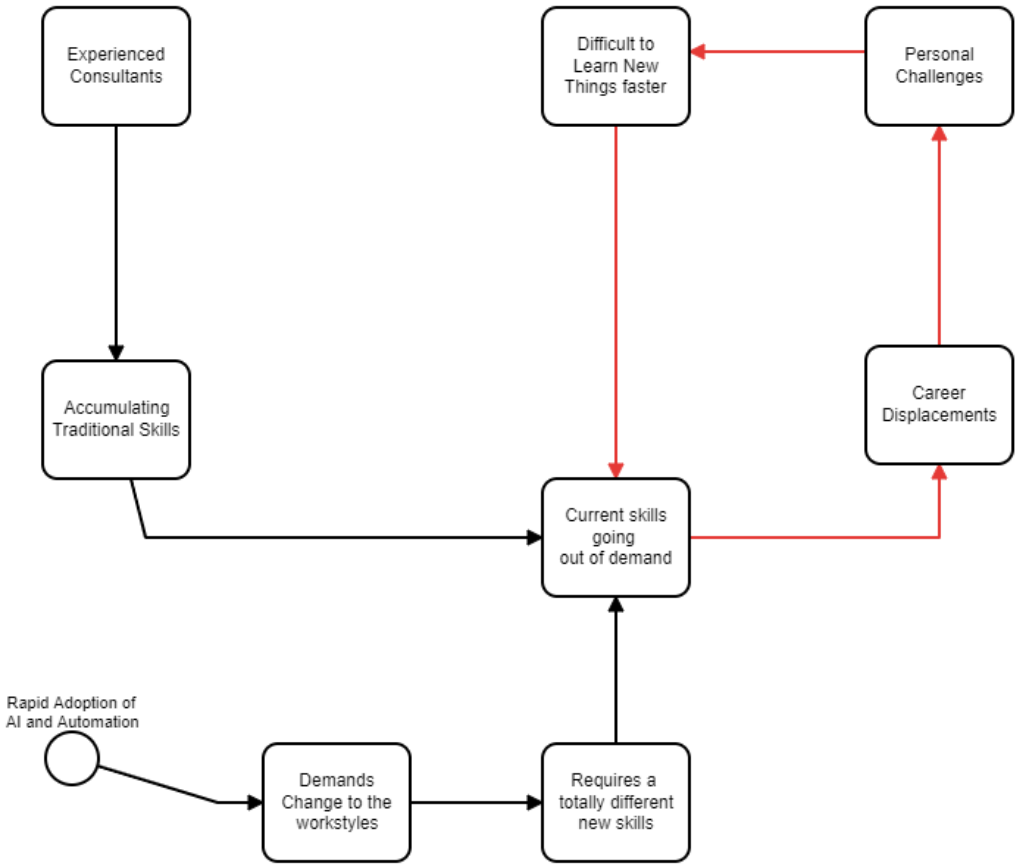

Figure 4.0 vicious cycle caused by personal challenges.

The experienced IT consultants who gain about fifteen to thirty years of experience reach the ages of the late forties to the late fifties at which they usually have much personal life's obligations related to additional expenses such as mortgages, education of children going to college, and other higher expenses. Frequent career displacements introduce personal problems on these fronts. In this regard, what was stated in the collaborative research group by the statement; *'in their private lives of senior managers and workers, most of them have families with school-going children, mortgages, and set of long-term financial commitments that were made with their false belief of career security and loyalty- However, they ended up with unexpected layoffs…'*; seems to speak for itself. On the issues related to attitude, as one person

said, *'it's not easy to adopt new changes (technologies/paradigm in this case) as it requires time & money and not to mention changing existing habits'* cause extreme personal stress. The other emotional issues arising from situations like *'expert all of a sudden become an apprentice'* along with career issues [having to work long hours due to short of staff] affecting the personal life magnifies the personal stress factors. For someone with tremendous personal stress, it is impossible to learn things too quickly. This difficulty to learn makes the specialisation extremely hard. More they delay the effort for specialisation; their skills face the risk of losing demand. When one reaches that stage, the demand for change becomes even stronger, making it a vicious cycle.

The second vicious cycle faced by experienced IT consultants can be called the '**vicious cycle due to resource limitations**', which is depicted in Figure 5.0. Those who have to get specialised in modern skills either face financial stress because it demands money or time stress, because it demands a lot of time, making it difficult to learn things very hard to learn quickly. That, in return, accumulates more skills that will be necessary to learn even faster to become specialised.

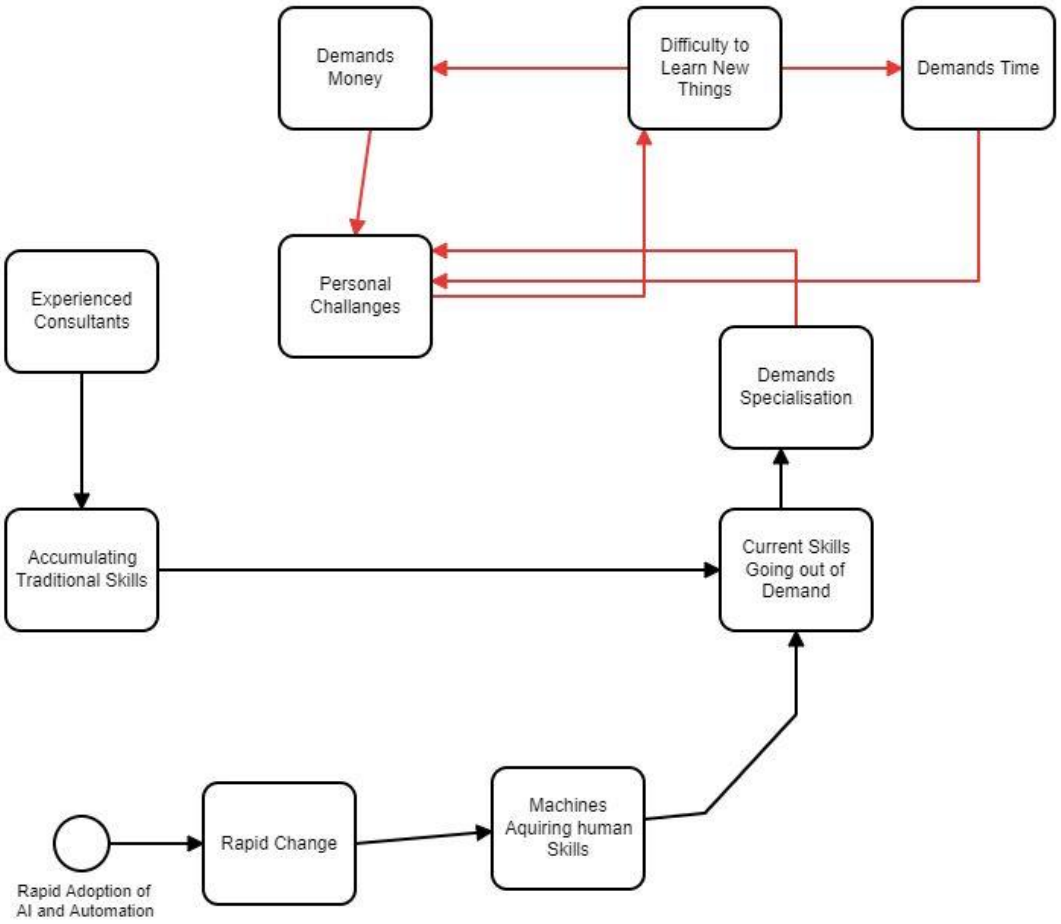

Figure 5.0 vicious cycle due to resource limitations.

The third vicious cycle is one caused by a personal bias related to entrapment (Ibrahim, 2016). Hence, this vicious cycle deserves the name '**vicious cycle due to entrapment**' depicted in Figure 6.0, which is caused as a result of an IT consultant facing personal challenges due to procrastinating on a career that only relies on traditional skills, working harder with the hope that the extreme loyalty would protect the job. Thus, the person continues to get buried in legacy technologies. As one research group member stated, *'loyally stuck with respective organizations with Jurassic technologies'* can lead to this fate. Such long-term attachment to traditional skills can immediately bring the loss of demand, which can lead to any of the other two vicious cycles stated before. When the person finds it difficult to change, the one becomes more and more loyal

to the existing job in which one feels more secure. It again leads to a vicious cycle. The risk in this cycle is that it can merge with any of the other two previous vicious cycles making the matter even more complicated.

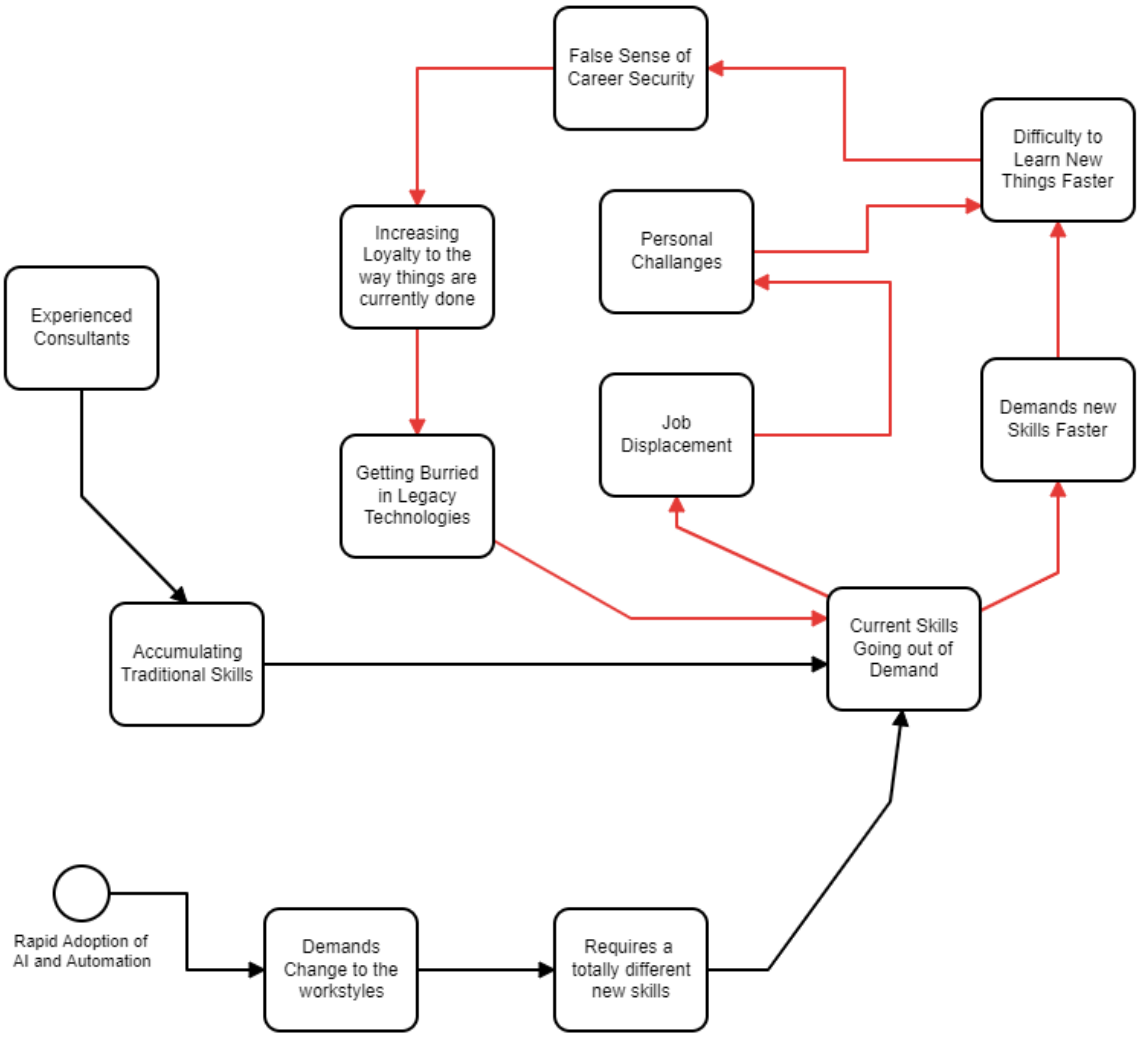

Figure 6.0 Vicious cycle due to entrapment.

This entire research is in place because the influence of the emerging effect of the rapid adoption of artificial intelligence and modern automation has caused challenges to Princeton Pragmatics. As an IT consulting company, it heavily relies on the success and the marketability of the IT consultants. Due to its smaller size, it relies on a niche marketing strategy and uses experienced

IT consultants in its business. As it was evident during the problematizing phase, it is the experienced IT consultants who are mostly affected by the trend - losing their marketability influences the profitability of the company. Since August of 2018, the immigration policies in the United States have been tightening (Swanner, 2018; Wonnenberg, 2018), and that trend has also made it difficult to find immigrant IT professionals working on VISA. It causes the rising on-shore IT costs to the end clients; as a result, the beneficiary clients of the IT services re-align their strategy for cost minimisation. As a result, Princeton Pragmatics and other consulting firms have to deal with a per-unit price drop. The uncertainty of the future demands of the technical skills in the market and the many unknowns that comes with it further complicates the organisational challenges. When the current skills of the experienced IT consultants drop in demand, the company immediately faces challenges. When the future demand is unclear, and when available funds to implement sophisticated learning is scarce, it makes it extremely hard to develop a straightforward strategy to remain in the market. The work done in the collaborative research group during the problematizing cycle revealed that what was recognised as a problem during the pre-stage of the research is a genuine problem. But the insight from the problematizing work further enhanced the understanding of the problem. It provided more details on how the situation affects individual IT consultants revealing several personal challenges which I could not discover alone without doing collaborative sensemaking. As a result, the original overarching research question remains valid within the context of the research. It is apparent now that it was correct to select the individual IT consultant as the unit of analysis of the research as the experienced IT consultants are found to be entangled in at least three recognisable vicious cycles. Hence, the next research cycles will focus primarily on addressing the challenges faced by the experienced IT consultants in the form of an actionable model and allow it to inform the future strategic renewal process.

3.5 As a researcher, what have I learnt during this research cycle?

This problematizing research cycle has been a very important stage of this entire research. Defining the problem as clear as possible is vital in this stage. It is a preview of how the data collection and data analysis would lead to various outcomes in terms of new knowledge. Hence, the experience gained during the data collection from the collaborative research group and then analysing about seven thousand words of condensed information could inform me what the data

collection and analysis of about twenty-fold of that size is going to be like. Although text analytics is not a new experience to me, the use of MAXQDA qualitative data analysis tool, and using it for problematizing is a new experience.

When I designed the data collection approach within the collaborative research group, I initially expected that I would be able to find more time commitment from the group participants. However, the decision to request only two hours of commitment was the right decision as it looked like the right level of engagement that can be requested from busy professionals. It required a lot of patience to wait to get the necessary information. Previously, I had involved in CAL sessions conducted in the online classrooms where I had to involve in critical action learning research projects. During those sessions, each student had an obligation to deliver output, and they were graded based on how much they contribute to knowledge creation. In the case of this research, there is no such reward or penalisation as such. All these research group participants are volunteers, and they could only provide their contribution, only when they had the time to contribute. These are different experiences which a researcher has to gain, as most academic research work is done. It was interesting to observe how the diversity of opinion can generate multiple perspectives.

It was by generating multiple perspectives using the comments made by other participants in the collaborative action research group; I could find what I had omitted during my first-person inquiry about the problem. In section 2.5, I acknowledged that I have three different roles in this research and that I need to be cognisant about them. However, when doing a reflective analysis on how I described the problem in chapter one, I could recognise that I had ignored the opportunity to use my own role as a technology consultant as a mirror to look at any blind spots which I may have had during the first-person inquiry. Instead, I was only focusing on role duality between my role as the owner of the company and the role of the primary researcher. While the perspective of the owner of Princeton Pragmatics is extremely valuable, from a management decision-making perspective, understanding the issue's impact on me for being a consultant would have been valuable.

Although I ignored the second perspective I had of the problem as an IT consultant, I was very cautious as a researcher to validate whether my participants told what I wanted to hear. This caution was necessary because I assured the research ethics committee that even if I cannot give

assurance that my research participants will not tell what I want to hear, I will do the necessary to ensure that they had not done so as soon as I collect the data. As a reaction to the comment made by the ethics committee, I was quick to extract individual perspectives. When I compared each different perspective with that of mine, I realised not only that these perspectives were unique, but my individual perspective lacked my own observations on how the issue would impact my role as a consultant. For example, both Kalupahana and Sid had similar sentiments about the problem; however, Sid's focus was mostly on the global picture, whereas Kalupahana's perspective was directed towards personal challenges. In quite the opposite view, Naren was of the opinion that the emergence of artificial intelligence is not going to replace humans from work completely. Desai held a middle ground in his opinion while not denying that the emerging trend is likely to take away some of the existing jobs from human IT professionals. These diverse opinions initially showed that it is hard to make any conclusions. However, when coding has been done, I could see that several vicious cycles are emerging in the picture.

3.6 Implications for the planning of data collection cycle

There are many implications to how the data collection and data analysis could be done during the data collection cycle. During the problematizing cycle, there have been unexpected challenges about the sudden unavailability of the individuals due to unforeseen personal issues. Therefore, I learnt that it is important to conduct the data collection as soon as possible because a long-term time horizon towards data collection can lead to more uncertainties. It is tough for working professionals to give appointments several weeks ahead of time. It is necessary that I maintain the contact information of each individual updated within the system. My priority in the data collection cycle is to record the skype video call with the interview participant and ensure that it is stored in a secure manner. Due to ethics obligations, I am not allowed to share the video recording to third parties or to upload to other commercial sites to use automatic tools to transcribe. It means that several hours of manual effort may be necessary to transcribe that information. Therefore, I decided to schedule the transcribing effort to occur after the recording of the interviews complete.

The data analysis in the problematizing cycle showed that it is important to keep the analytical information gathered at different stages isolated. For example, the analysis of the pre-stage of the research would only reveal my initial understanding. The problematizing cycle reveals a

synthesised form of multiple perspectives of individuals who participated in the collaborative action research group. These two perspectives have to be compared separately. The data collection research cycle will be conducted with a completely different quota sample of participants. The inquiry process with them will be very different because I will be presenting a completely different set of questions. Therefore, while re-using the codes from one stage to the other, it would help to generate analytical constructs as snapshots of different stages of the research. As a result, the data collection which occurs after improved understanding of the research will not get overly polluted by the artefacts generated during the initial phases of the research. The data collection phase will attempt to gather information in a much-focused manner to address the research questions and come up with an analytical model.

Chapter Four – Data analysis action research cycle

4.1 Introduction

The data analysis cycle involved qualitative analysis of 1884 minutes of video recordings of the seventeen research interviews conducted during the second cycle of this action research. The recordings, when translated into transcripts which can be analysed resulted in seventeen transcript documents consisting of a total of 216949 words. These large amounts of data could have been analysed in multiple ways, for example giving prominence to individual perspectives, and various combinations of combined perspectives based on the types of participants and most importantly giving primary focus to the central topics of the problem analysis.

The coding process started by re-using the original coding scheme imported into the qualitative data analysis project in the MAXQDA tool. As the coding process progressed, whenever additional themes emerged, such themes were added to the coding hierarchy. As the analysis continued; around the analysis of the fifteenth participant's data, it was noticed that no new themes emerged. Therefore, it was decided not to conduct optional second stage interviews. This decision was also helped by the fact that the participants willingly completed the questionnaire even if it took more than 90 minutes for some of them.

The data analysis done in this research was initiated with two goals in mind. The first goal was to evaluate the outcome of the problematizing cycle. Mainly, it was necessary to validate whether the three vicious cycles which were identified during the problematizing research cycle is confirmed (or strengthened), or rejected, during the data analysis. Secondly, and most importantly, it was necessary to obtain insight from the data analysis towards developing an actionable model which can be used by the beneficiaries of this research to generate actions to navigate through the problem. The data collected from the interviews enabled several themes that could help to identify how to shape each stage of this actionable model. However, no individual participant can provide details of how the actions can be taken. Instead, as the researcher, I am responsible for delivering an acceptable actionable model which is backed by sound theoretical knowledge obtained from peer-reviewed scholarly articles. In action learning or action research, all participants work in a democratic process; as a result, no individual participant would tell another to take specific actions in the form of requirements. Instead, they work as comrades who

support each other, helping each other (Revans, 1982). Therefore, when coming up with an actionable model, I understand that the actionable model provides only a framework of guidelines which would help other's taking actions. I see a similar analogy in creating a fabric which is versatile for many people who can produce many varieties of costumes and products from it. Therefore, the set of actions which might be taken by different individuals adopting the actionable model could have a reasonable contrast; although, each different set of actions will have some hallmark characteristics of the actionable model.

4.2 Analysis of different perspectives

During the problematizing cycle, the initial understanding was re-evaluated in a collaborative action research group consisting of six individuals, including me. In the data collection cycle, I could investigate the issue among a broader group of interview participants consisting of seventeen different individuals. This data analysis effort involved inductively [observing the repeated occurrence of similar claims under a given subjective context] validating the previously established collective understanding of the problem.

The source of the problem which I identified during the initial stage remained unchanged after the problematizing cycle. As an effort to broaden the understanding of the source of the problem, I explored whether the overarching research question, which was related to 'the rapid adoption of artificial intelligence and modern automation' is still valid. Also, whether it can endanger, IT professionals, to struggle in three different vicious cycles which I had identified. Therefore, it is quite useful to review what was understood in this regard during the data analysis as the first step.

4.2.1 The socially constructed view of the rapid adoption of AI and automation phenomenon

During the interview process, some participants compared humans to a sort of biological machines that are far more intellectually superior to any other form of human-made machines available. Nevertheless, there seems to be some business rationale behind why companies would prefer automation or even adoption of artificial intelligence in the place of routine processes which were previously dealt with by humans. Out of the seventeen participants, three of the individuals are currently holding very senior-level decision making roles in technology-based

companies. Three of them have very similar perspectives about the business rationale. Kevin, who is the president of an automated payment processing company, believes that machines are *'better than the human if it is the same thing they are going to do'* in repetition. According to him, in repetitive work, *'human beings will do mistakes'*. Rajiv who is a chief information officer of a reputed mid-sized bank in the New York City says that most banks are faced with competition from small FinTech start-up companies [FinTech companies have become competitors and collaborators at the same time with banks]. These FinTech companies compete with low-cost automation and out-sourcing. Due to this competition, he thinks that most of the *'process should be automated, and the staffing level'* would be *'continuously going down'*. He thinks that once his company offloads the in-house data centres to cloud, the automation achieved due to that would significantly reduce the need to have the in-house system administrators in his IT staff. However, it might introduce a limited number of new job opportunities for cybersecurity specialists and IT architects. On a similar note, Dwayne, who is a chief technology officer of an artificial intelligence technology company stated that in *'consulting you are forced to be on top of the technology trends when you work for an organisation'.* However, *'they are not necessarily picking platform to just to keep the people employed'*.

Besides these three executives, several others in senior roles, echoed that there is a strong business rationale behind modern automation. Linda who represents a leading consulting firm within the financial industry states that *'not only it changes whole culture change for a company from end business side change manual steps of the business to make it automatic*'. Thus, it reduces manual tasks in the back-office and middle-office activities in the financial institutions. She says that technology companies have built tools using certain syntax so that other companies using their tools can reduce the engineers and software developers. When it comes to infrastructure-related jobs; modern automation has taken away the low-level IT technician jobs. Such jobs involved production support troubleshooting activities, and continuously watching monitoring dashboards, according to Namal, who works as a senior IT manager in a government organisation in New York City.

As it was repeatedly checked during this research, if there is evidence that machines are now acquiring the skills previously only be possible for humans, it will be an indication that AI in

automating activities can speed up the impact of this investigated phenomenon. Samson, who is a highly rated software developer and an architect in the New York City market, claimed that *'I myself developed solutions for voice recognition for Alexa and Google assistant, also Apple business chat'*. He states that those solutions showed that the performance of the machines in voice recognition and synthesis is indistinguishable from the humans [it is hard to recognise if it is a machine or a human behind it]. As a scientist who contributes to high-performance computing (HPC) using some of the faster supercomputers in the United States, Rasika believes that *'real people can be replaced'* by machines. For example, he said that *'improvements in image recognition capabilities you can take one very clear example would be something like a radiologist'*. Channa, another very experienced computer scientist who participated in the interviews, showed a similar example from the legal field. He says that optical character recognition (OCR) coupled with AI, has been able to reduce the need to have paralegal officers in law offices. Such technologies could analyse a large number of court cases and provide insight to the lead attorney. Another application he has witnessed is the job of the person who is making the last two mile's delivery of a purchased item. These days delivery robots who have gained spatial awareness have been taking that job to their task.

In the technology space, many infrastructure maintenance efforts can be now automated, according to Sriram, who works as a chief IT architect. He confirms the previous observations of this research during the problematizing effort that the cloud-related continuous integration and continuous development application can automate the software release management process. He pointed out about another developing trend which never existed during the initial stages of the research. It is a classic example that wicked problems of this nature evolve into more complicated nature while changing its form. Sriram thinks that the impact of the COVID-19 pandemic which impacted the whole world demanding the need for social distancing would make those sceptics of the AI and automation re-think the appropriateness of AI and automation in this modern world. His view is that *'if you had the robot serving you kind of you know in the hospital',* in a situation like a pandemic it could have been helpful. Such trends can boost the support for AI and automation.

During the last five years, Miley has led the initiative to transform one of the global systemically important banks in the USA to become a digital bank. Now, she is a leading professional in an

AI solution provider company. She has witnessed the recent growth of AI capabilities as a contributor to the technology. She believes that many routine tasks will be automated, and humans could focus on analytical activities. Her confidence in the current performance of AI was also reflected again by Kevin, who claims that the infamous supercomputer of IBM called Watson is now capable of providing financial advice to humans. He says that *'is a human being replaced'* and the AI capabilities determining the business decisions can significantly impact the technology professionals. As a result, *'those who haven't quickly tried to learn this skill have been left behind'.*

After having explored the evidence about the emerging phenomenon and whether machines have really become more humanlike; it is essential to find if there are more evidence of real IT job displacements. To answer this question, Linda stated that Robotic Process Automation can replace many human workers while *'natural language processing and that chatbots improve services that will reduce a lot of repetitive tasks in projects'*. She believes that many people will worry about their job security and that a *'lot of people may lose their job because of an AI'.* What Miley witnessed among job losses was that many of the database administrator roles are getting diminished from IT organisations, and people in those roles have to change to a different role. It is because they *'are also automating a lot in the databases'.* Also, '*every software company is automating'*; they are making changes *'in such a way that it is self-healing self-manageable'.* In this environment, even the skills of the software developers are also changing, Miley reiterated.

Like Miley; Nimoy, who has had about twenty years of experience as a software developer mainly catering to the financial industry in the United States says that software developers are forced to work on AI and machine learning even if they did not want to do that. He thinks that *'the repetitive coding stuff could be replaced'*; however, software development will prevail as a profession. Similarly, *'I definitely think that standard boilerplate application development might end up getting automated'* were the exact words used by Channa to describe the same concern which Nimoy had explained. According to him, the IT infrastructure maintenance jobs involving, *'fault identifying, cutting machines or distributing workloads',* are already automated. Channa further adds to his claims that those who have gained skills involving sophisticated tools related to AI and automation will still have an opportunity as there will be a few more highly paid new

jobs that will be created. But it is not going to be large-scale job creation. However, *'do I think there will be a lot of demand for like basic coding stuff? I don't think so';* he says.

Among those interview participants who thought that his job is not much impacted by AI or automation; Justin who has been working for the same Enterprise Resource Planning software vendor for consecutive twenty-five years states that modern software does not involve that much of coding but requires customisations using configurations. He thinks that *'definitely it will cut down actually people's number of software and consultants'.* Although he leads the technology wing of an AI solution provider, Dwayne also states that menial coding tasks will be eliminated from software development. His company provides tools that strengthen the AI capabilities to the Salesforce technology ecosystem. According to him, *'Salesforce studio is going to incorporate a lot of this automation to kind of help replace the need for so many developers'*. Since these modern toolset demands human IT professionals to have a different set of skills, when looking at from a demand and supply perspective, Dwayne questions whether *'they have the right skills?'*

Among the types of jobs that are mostly being affected by the disruption of AI and automation is in the IT operations side. Rajiv says that *'machine will not replace human, but clearly machine will reduce the human needs or the number of personnel in the banking operations etc.'* According to Namal, the *'self-healing, self-adjusting for resilience'* capabilities have made the steps from application deployment to operations almost entirely software-driven. Narendra, who has converted from a mechanical engineer to a network specialist, says that *'you don't need ten people to do networking anymore'.* It is clear evidence that the work available to the network specialists are gradually decreasing. Although his background is in software engineering, Justin too believes that *'the number of jobs in demand will be less'* for the network engineers because such activities are currently done by automated software. However, as a job, it will continue to exist in the market.

As an overall observation, Rasika thinks that people will be getting replaced or forced into early retirement unless they are willing to change their skills. According to Miley, IT professionals must upscale. They need to *'get into learning of AI applications and what AI can do to you, and how you can be an integral part of this AI revolution',* or else they will lose their job. According to Kevin, the most impacted segment of the workforce is the experienced IT professionals. He says that,*' I genuinely think that AI professionals with baggage* [traditional experience that is

becoming outdated] *either looking for a crisis to be happening in the future of something substantial or re-skill or re-tool yourself'*. From the future of the IT consultant's perspective, Kevin thinks that the name of the job title might continue to exist, but it will be a completely different job. In his own words, *'I don' think IT, consultant, as we know today is going to possibly exist tomorrow* [meaning future]*';* because *'100% of the skill set will change'*. If an IT consultant needs to be employed in the future, Kevin thinks that they *'got to be smart', 'be brighter',* and could acquire *'a higher level of intelligence'.*

The design of the thesis was meticulous about ensuring the diversity of the participants; as a result, the selection of the participants represented different job roles, market segments and even ethnicity. As expected, I could find a few individuals who have an opposing perspective on the common rhetoric. They felt unchallenged by the emerging phenomenon.

First of all, the comments made by Dwayne as a CTO of an AI technology company went on to show the existence of the disruptive phenomenon. He does not think that humans can be completely replaced from the workforce. He confidently makes this claim that the *'decisioning process at least in our world it is not close to being replaced'.* Sarath, another computer scientist who has held multiple technology director roles in the past, now working in the robotics surgery domain, also seems to have a perspective aligning with Dwayne. In his view, '*if you want to change it right away to do something you know closer to that in terms of the functionality human being can do it easily'.* He thinks that it would be hard for machines to handle such variations; as a result, humans have an advantage. Pointing to the fact that there will be some amount of work left for traditional skills as not every computer system can be changed as anyone would wish, Justin too aligns with Dwayne and Sarath that some jobs will be available to human IT professionals.

Antonio, an experienced IT professional who works for a very large global financial institution, has an interesting perspective which is consistent to the scholarly divide which I observed within the literature which I referred to during the chapter one of this thesis. He says that if there is a camp willing to rely on complete automation using artificial intelligence capabilities, there will be another camp who will be opposing that view in a very large organisation. *'I'm saying it's not going to end'* he confidently provides some assurance about the future of the software engineer's job.

Two other individuals thought that the introduction of AI and automation had not reduced jobs; instead, it has increased the jobs. Surya is an IT professional who started his career as a developer who then converted himself to become a test automation professional. Later in his career, he changed to an IT manager as he felt that it would be necessary to change the job to combat the issue of skills becoming obsolete. As an individual contributor-senior-project-manager, he thinks that certainly, the team size has reduced, but the number of teams doing different projects have increased. He has witnessed companies moving towards machine learning. When discussing job displacements, he claims that *'I have not seen the companies basically cutting short on your number of employees or the number of software engineers that we are seeing'*. Sriram is another individual who believed that more IT jobs had been added, despite his experience about extreme automation of software development process using continuous integration and continuous automation. Therefore, it was necessary for me to rely on secondary data to understand this diversity of opinion and whose opinion would be more relevant to the context of Princeton Pragmatics. The job growth statistics available in the 'occupational outlook handbook' of the 'the U.S Bureau of Labor Statistics' shows that there is a projected growth in specific IT jobs. However, these jobs require a very different skill set, such as Cloud computing collection and storages and Bigdata related functions. Also, the salary distribution data for popular IT jobs available from Indeed.com (2020) and the salary and cost of living comparison that can be estimated from the tool available at Areavibes.com (2020) suggest that the availability of high-end jobs for experienced IT consultants may not be that many as growth projections suggest. The option of generating income from regions with a low cost of living may not generate enough income for someone who has a family in the northeastern region of the U.S.

Based on evidence analysed so far, and considering what type of service offerings are available in the current market of the Princeton Pragmatics, it appears prudent to recognise the emerging trend as a disruptive threat which can be manipulated to become an opportunity. Therefore, the naturally occurring next question would be, in what timeframe this phenomenon will cause disruptions or how rapid will be the change enforced by it? Many interview participants attempted to answer this question.

Three of the interview participants thought that disruption is already taking place. Although he does not have a direct impact from the emerging trend, Sriram believes that if one does not *'have*

the new technology last five years', whatever the irrelevant legacy experience will not take them anywhere. Channa thinks that *'tool or our experience cycle is moving pretty rapidly'*. That is a reason which seems to make the up-skilling an uphill battle for many experienced IT consultants. According to Namal, those areas in which the traditional skills had been used are now excelled by machine learning.

Although there is a limit to every disruption, Justin too thinks that AI and automation are going to *'invade everything',* if for example, *'after five years from now'*. Kevin thinks that *'IT consultants as they define today will not exist in 5-10 years'*. When considering the rapidness of this emerging trend along with the established business rationales, it is difficult to find a happy medium for both the end-clients and the experienced IT professionals. Patricia says that the fact that *'technologies evolve like this faster and faster'* could be viewed as a part of a bigger picture where *'people become obsolescent quicker and quicker'*. As a result, *'it is what is in the interest of the company to do this* [adoption of AI and automation] *in an ethical way'*.

4.3 How data analysis informed the validation of problematizing outcome

At the conclusion of the problematizing cycle, this research had identified three vicious cycles. They represent difficult to escape situations which the experienced IT consultants could fall into. During the data analysis, thematic analysis was targeted towards digging deeper into these problematic cycles.

4.3.1 A deeper analysis of the vicious cycle caused by personal challenges

All the sub-themes in the code-map which fall under 'Personal Challenges' main theme except 'longer work hours', 'demands money', 'demands time' were analysed against other common themes such as 'rapid adoption of AI', 'Job Displacements', and 'Skills at Risk' themes. The code map depicted in Figure 7.0 shows how the co-occurring code frequencies revealed how some of the themes became more relevant to the vicious cycle one.

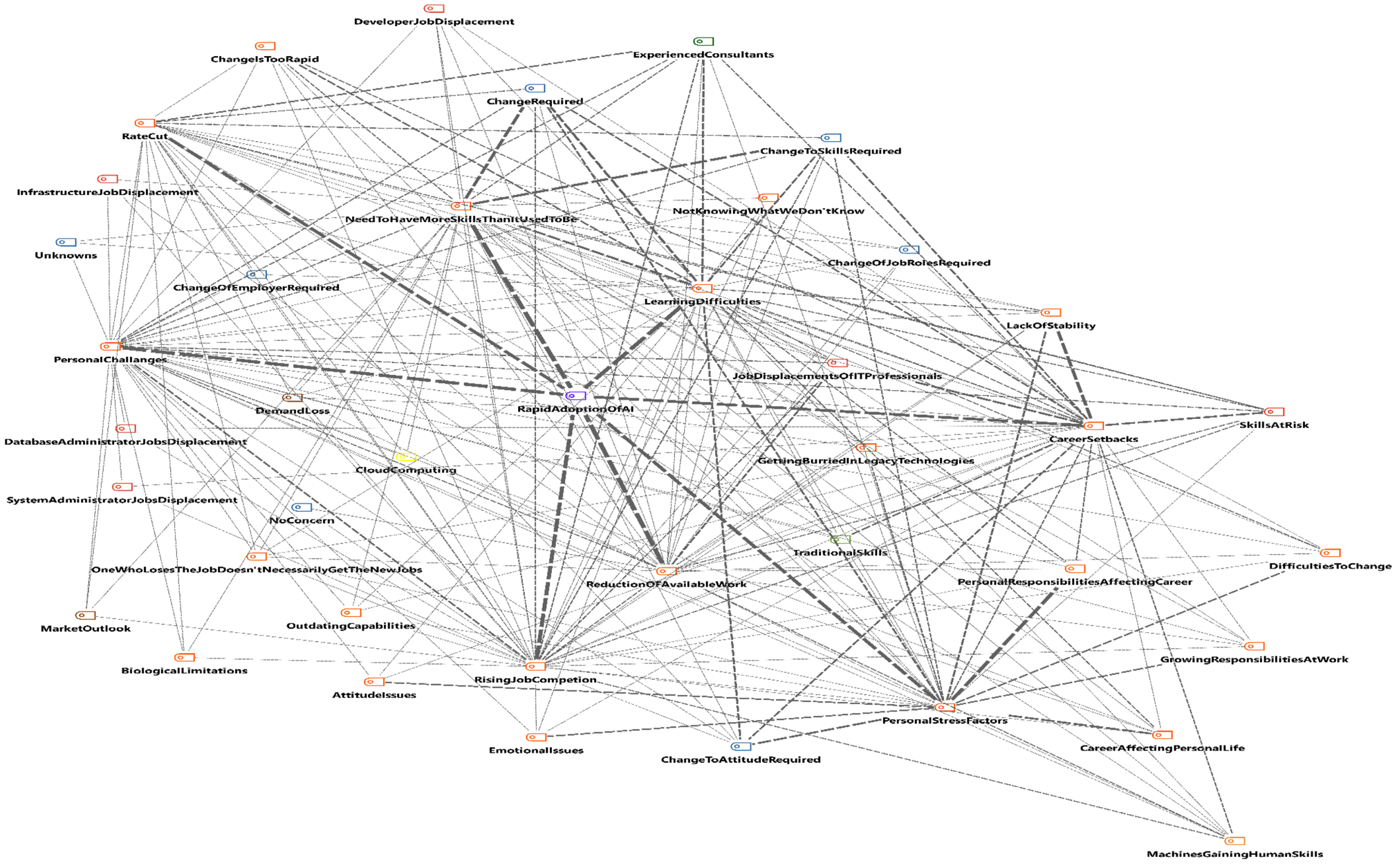

Figure 7.0 Code map depicting the co-occurrence of themes related to the vicious cycle caused by personal challenges.

What data analysis revealed from the interviews about the reduction of available work for IT professionals during the vicious cycle due to personal challenges is illustrated in Tables 2-A to 2-F. The thematic analysis of the coded transcripts revealed that “Reduction of available work”, “Rapid change demands changes to the workstyle faster”, “Existing skills are going out of demand”, “Increasing competition”, “Challenges in personal life” and “Attitude issues” appear to be co-occurring themes in relation to the vicious cycle due to personal challenges.

According to the quotes in table 2-A, it appears that even without AI, automation has been able to reduce the work that needs to be done in software development compared to a few years ago. Automation has been able to eliminate menial tasks from software development, reducing the available work. Executives leading the organisations rely on professionals who can work with these efficiencies in place. They do not like to retain old-style developers who do not have the efficiency.

As the quotes illustrated in Table 2-B, the emergence of the novel technology has been happening too fast, recently reducing the technology cycles. Technologists are required to change their skillset more frequently than ever. It has been quite challenging for the older generation of IT professionals. The quotes in Table 2-C well explained reasons why those professionals cannot sustain with their legacy experience. It shows that getting too attached to the legacy experience is risky for the experienced professionals, and they could treat it as a sunk-cost and start evolving with the new technology.

When the amount of work available gets reduced while their current skills are going out of demand, the experienced professionals have to deal with competition as described by the quotes listed in Table 2-D. This competition can come from the younger generation of IT professionals who are available at a lower wage. The trend that is different from previous automation cycles in history is that this time, the machines have been able to replace repetitive tasks done by those who build such technologies.

The most critical characteristic of the vicious cycle one is evidenced in the quotes listed in Table 2-E. It shows that personal challenges introduced by commitments at home, and the overloading responsibilities at work affect the ability of experienced IT professionals to upgrading skills. Their age, responsibilities and stress factors seem to be creating learning difficulties. These unfavourable factors further seem to get aggravated when the behaviour of the experienced

professionals get impacted by some of the attitudes which they have developed over the years. The table 2-F lists out some of the comments made by the interview participants about these attitudes and their impacts.

Relevance	Participant	Quote	Implication
Reduction of available work	Dwayne	*'... fast forward to now no one writes any code to write a page unless it is super custom; I just have a standard CMS* [content management system] *and all that one ...'*	Even without AI involvement, the amount of work that is required to accomplish the same outcome would be less today compared to twenty years ago.
	Dwayne	*'... going to replace the entry-level tester, the entry-level developer; get rid of the menial tasks that are out there because it's going to be focused on more quality, of more complications, more complicated integrations'*	AI would get rid of menial tasks.
	Dwayne	*'... the nature their DNA requires them to pivot faster because selfishly billable hours disappear '.*	IT consultants at the present struggle to find work while having to change their skills rapidly.
	Kevin	*'... you are going to write 50000 lines of programming today I will fire you and move on.'*	As the head of his company, he would not retain old-style developers who do not have the efficiency.
	Rajiv	*'I would rely on the consultant I send when I need, I use it for the project by project basis and let them go'.*	Scope of the work available will be short-term.
	Narendra	*'We don't have to send a network engineer to set up a new site anymore.'*	Although there may be a job opportunity for highly skilled technologists who are not outdated, there can be a significant reduction in work available.
	Channa	*'Large part of that can be automated away by developing boilerplate code that can be adapted by smart systems and automated systems.'*	It shows that the development of AI is moving towards meeting the aspirations of getting rid of developers who might want to write 50,000 lines of code in a project.
	Sriram	*'Athena is one of those services given by AWS. Machine learning basically somebody has to write the algorithms, right? Now, it becomes more like a tool if you see the new Athena tool it is more like a bunch of setup tools.'*	It means that quantitative developers need not code complex algorithms anymore.
	Sriram	*'The biggest change ... it's the automation of the software development. It used to be 1/4 redeployment ... not things like Amazon or Google plus per second ... you know the number of deployments going to production keep on going.'*	Reduction of the amount of work available to the system administration professionals.
	Sriram	*'...you can automate part of it. CI/CD part, right? Like you said 2015 and prior we didn't have that fun, right?'*	Reduction of the amount of work available to the system administration professionals.

Table 2-A quotes implying a reduction of available work during the vicious cycle due to personal challenges.

Relevance	Participant	Quote	Implication
Rapid change demands changes to the workstyle faster	Linda	*'… developer's things are always changing so there's always new tools that you have to learn but definitely…'*	It is the nature of the job of a software developer that they need to change more often
	Antonio	*'… what has been always happening right? You have to adapt or you're out; that's it.'*	If one cannot adapt, it is hard to survive.
	Rasika	*'See, all the people getting replaced and they may be forced to early retirement unless they are willing to go through new skill training type of thing, which most may not be able or would like to do.'*	The nature of the current situation seems to be more disruptive.
	Kevin	*'You have to up-skill yourself, you have to keep your training going be relevant and current.'*	Change to skills is necessary.
	Kevin	*'Change is constant and change is important, change is inevitable ... I remember this as a financial concept called sunk cost. If you don't understand what that means. Fast.'*	Past investments on legacy skills could be treated as sunk cost as change is constant.
	Justin	*... AI thing because it changes rapidly than you have to work very hard to be in your trade.'*	The rapid change is difficult to sustain.
	Patricia	*'at a snapshot of time where people … between forty and sixty-five or so really do see the world differently. And the changes are really happening for them faster than ever before'*	Older generation finds it difficult to adapt.
	Patricia	*'They are going to be willing to change jobs every 18 months. ... now like every two and a half years everybody is changing jobs, but you know this idea of long term build your career within a company is just not there.'*	Rapid change makes a long-term stable career impossible.
	Miley	*'conversation we are having today and let's say in six months when we talk again and one year from now, we talk again I think we will be having very different conversations.'*	Change to technology happens so fast.
	Channa	*'… many projects going on like every six months or one year or so the next project they are not likely to use the same technology that they used in the previous project.'*	What is considered as current, changes in between projects.
	Narendra	*'…disruption to every domain and every technology is going to be much faster having to have AI involved in every function.'*	AI is creating a rapid disruption everywhere.
	Sarath	*'… it won't take five years even it is not that far into the future for us to kind of accomplish certain degree of automation and robotic advances.'*	Robotics and automation will make significant impact soon.

Table 2-B quotes implying a rapid change and what it demands during the vicious cycle due to personal challenges.

Relevance	Participant	Quote	Implication
Existing skills are going out of demand	Antonio	*'... because of the age because of the experience because of the numerous things…'*	If an experienced IT professional is out of the job, it is very difficult to get into another.
	Kevin	*'…nobody is paying you to be an old guy.'*	The mere experience will not be sufficient.
	Kevin	*'Everybody with skill set from 2010 is fired, five years from now. If you have skill set of 2017, 18, 19, you can get a job but with less when we think about it.'*	Skills are becoming obsolete at a rapid pace.
	Nimoy	*'…only one platform one language will not help. '*	One is supposed to know about twenty different types of different software technologies if that person has to find a job.
	Channa	*'If somebody try to apply say my company today with the kind of experience, I had at the same company five years ago I don't think we would be considering hiring that person that much'.*	Skills are becoming obsolete at a rapid pace.
	Channa	*'They are going to wake up one day the whatever the system that you are maintaining is now deprecated.'*	It is an extremely bad idea to keep on doing the same kind of thing for many years.
	Sriram	*'If you don't have the new technology last five years plus even though we have you had experience won't take you anywhere ...There will be one day not your boss will change but your boss's boss will change. He will come in; completely wipe off all spectrum.'*	The mere experience will not take anywhere.
	Sriram	*'I asked all the interviewers what you did the last six months I don't go beyond one year'.*	Knowledge will be current only for 6-12 months.
	Sarath	*'You need to have a deep relatability to the problem domain that you are solving right? If you don't do that you don't do justice to what you're doing or what you're deriving a pay check out of.'*	One's skills cannot go out of relevance to the company strategy.
	Namal	*'Do you still use COBOL and other programming languages that we used to have? ... but most programmers who were doing that either have to learn other programming languages. Or you know lose their job or change their career altogether.'*	Emerging disruption is some similarity to what happened to COBOL programmers.
	Miley	*'I mean for 15 twenty years I'll tell you know we still have mainframes, right? How many people do we need?'*	Emerging disruption is some similarity to what happened to COBOL programmers, even at a much faster rate as the rate of the change is much rapid.
	Sriram	*'If you get a guy with 10 plus years' experience his salary range is very high but he doesn't have any skill set so straightaway, we will reject you know'.*	Outdated experience is not marketable.

Table 2-C quotes implying existing skills going out of demand during the vicious cycle due to personal challenges.

Relevance	Participant	Quote	Implication
Increasing competition	Samson	*'If you have video you could speed it up even like you watching YouTube you could watch it in like wipe five-point half speed you learn faster yeah you could do it, but people are more limited in this regard.'*	AI can learn much faster than humans.
	Samson	*'...company would go for cheaper labour for sure and that would basically displace automatically will be displacing experience folks in place for you know the younger folks plus robots bots and stuff like that.'*	Competition from younger professionals.
	Kevin	*'Anything that is repeatable anything you do exactly the same way over and over again, it can pick up and learn quite quickly and do it without the same level of human error.'*	Companies prefer machines over humans on repetitive tasks.
	Samson	*'... management normally wants is a person who without like you tell it just does it even if it is the most stupid thing',* and *'less sophisticated* [machines with AI] *is probably the better.'*	Machines do not have to be identical to humans to be able to take over their jobs.
	Rasika	'*They are cheaper, and they may be harder working coming fresh out of college.'*	Companies prefer fresh graduates.
	Patricia	'*… big companies do it by they hire junior people for minimum contracts okay short term and part of the role of that internish person or that new person is to share what they know.'*	Companies rely on interns to deliver modern knowledge.
	Justin	*'... our company we are going for the kind of low cost. Low cost means we actually recruit low experienced persons, just out of the college.'*	Experienced people receive price competition from fresh graduates.
	Rajiv	*'...but the number of jobs that would be less then it's the survival of the fittest.'*	Lesser will be the number of highly paid jobs.

Table 2-D quotes implying an increasing competition during the vicious cycle due to personal challenges.

Relevance	Participant	Quote	Implication
Challenges in personal life	Patricia	*'... it is too early for them to retire also, mid forty, late forties, mid-fifties to early because their children are going to college, so that is a huge challenge.'*	Experienced professionals typically have more family responsibilities.
	Sriram	*'... you can't sit, and write code you get to go to the meetings and meeting steals you the whole day ... that is not your permanent place two years from now you go somewhere else they don't care how many meetings you attended ... Now this is a big challenge, ...is not an excuse for you to learn something new.'*	Some experiences demanding most of the time at work, do not deliver portable skills across jobs.
	Dwayne	*'...if you are diving into AI or machine learning you have to be ready to pivot every couple of years'.*	Difficulty to learn new things.
	Dwayne	*'The challenge as in any pivot ... is access to the technology and to use experience ... it's almost similar to graduating out of college the hardest job is the first one might be because you have no real experience etc.'*	Expert suddenly becomes a novice.
	Rajiv	*'It is understandable there's a learning curve with old age it's very hard with a different stage of your life it's very hard to add up completely so that's a challenge and that's the caveat.'*	Learning is difficult at an older age.

Table 2-E quotes implying challenges in personal life during the vicious cycle due to personal challenges.

Relevance	Participant	Quote	Implication
Attitude issues	Samson	*'... some of the people have a lot of they kind of don't want to go into they want to stick to what they know'.*	People like to stick to what they are familiar with without wanting to change.
	Samson	*'...people have been doing one thing for a while they keep resisted new development.'*	status-quo creating change resistance.
	Dwayne	*'They're running the risk of relevance over time.'*	Sticking with familiar makes individuals out of relevance.
	Patricia	*'... I know senior people say I shouldn't have to prove my worth because I have all this knowledge and experience no it is not that about that. It is about being useful always having and understanding that changes way more rapidly now than it ever did before'.*	Experience does not mean that there is nothing to prove.
	Patricia	*'Yeah, big changes to the attitudes. Yeah, I think How do you do that?'*	Huge attitude change may be required.

Table 2-F quotes implying attitude issues affecting the vicious cycle due to personal challenges.

4.3.2 A deeper analysis of the vicious cycle due to resource limitations

The evidence which was driving the detection of the second vicious cycle during the problematizing action research phase was mainly driven by two themes in the coding system, which are the themes ‘demands money’ and ‘demands time’. During the data analysis, the primary focus was given to the same two themes. Then, an analysis was done on the co-occurrence of the other themes to derive the insights for deeper analysis of the vicious cycle due to resource limitations. Figure 8.0 illustrates the code frequency map produced using MAXMAP feature in the MAXQDA analysis tool.

In the vicious cycle due to resource limitations, many insights showed that it could be entangled with other vicious cycles as well. However, there have been several unique claims made during the interviews, which were captured in the form of quotes illustrated in Table 3. In most situations, time as a resource was essential to establish continuous professional development by means of upgrading skills. Many people struggle to find time to study as they spend a reasonable amount of time to commute to work. However, when change is inevitable, it is necessary to accommodate some amount of time. Patricia’s claim that it is a myth to assert that there is not enough time goes to show that available time could be one variable that IT professionals must try to improve their adaptability to the emerging change.

When organisations provide formal training to their employees, they need to invest money to develop talent. Claims revealed during the interviews [see Table 3] uncovered that some companies have changed their hiring practices making the available opportunities to obtain organisation support very limited. Compared to addressing lack of time issues, the financial restrictions on the ability to adapt appears to be more challenging. Hence, addressing this vicious cycle due to resource limitations could involve incorporating well-thought resource utilisation and management strategies.

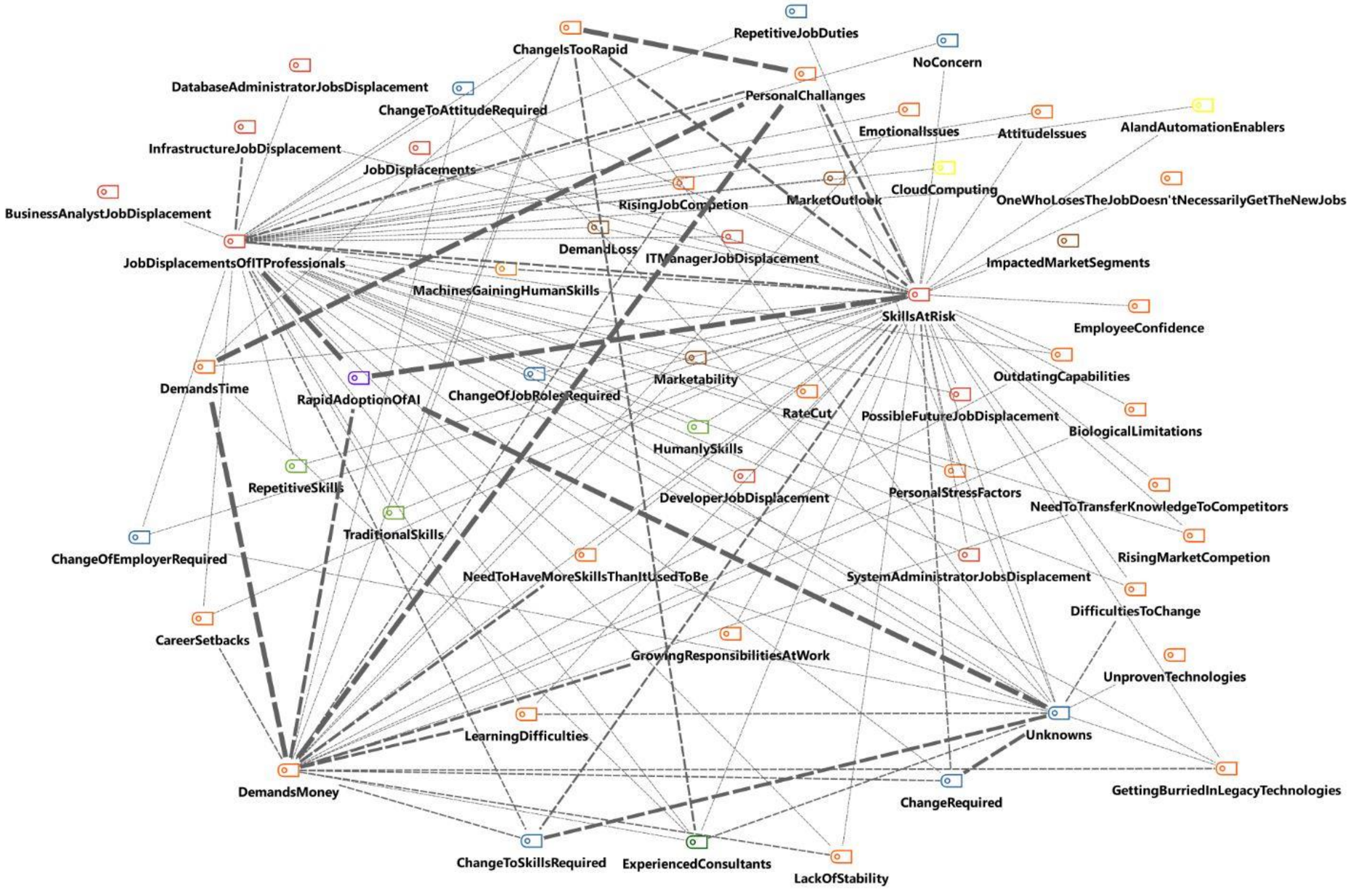

Figure 8.0 Code map depicting the co-occurrence of themes related to the vicious cycle due to resource limitations.

Relevance	Participant	Quote	Implication
Lack of time as a resource	Sriram	*'Most of the people who have 10 plus years of experience they are having hard time to catch up with the technology'*	Experienced people are struggling to catch up.
	Sriram	*'technology changes so fast, and they don't have time all the energy'* to spend on learning new skills. *'That is a killer for them to move forward as a developer'*	Lack of time to upgrade quickly is career damaging.
	Justin	*'would even for a lower salary, I would stay with what I know rather than trying to learn anything new'*	Some would sacrifice their earning potential to avoid upgrading skills.
	Justin	*'what you learn from the college and what you are using today is completely different. You have to spend a lot of time; you have to spend a lot of time to learn new stuff'*	More experienced the professional, more time is needed to change.
	Samson	*'people, unfortunately, are … limited by time; they need a person needs amount of time to learn right? That is a big limitation'*	People do not have all the time in the world.
	Channa	*'it is basically a time problem, hard to, when you have other responsibilities it is hard to devote a lot of time in learning new things'*	Time stress could be entangled with other vicious cycles as well.
	Nimoy	*'I am finding but not being able to utilise time, for example, I go by train right? I tried you realise that time, but sometimes it is hard'*	How one commutes to work affects the ability to find time.
	Patricia	*' it is a kind of like a false academy that people are thinking that they don't have time to learn'*	It is a myth to believe that there is no time.
	Patricia	*'companies would be wise to see that just adding more responsibilities to somebody isn't the way to have the lifelong workforce that you need'*.	Companies could consider training time as an investment.
Lack of financial resources	Dwayne	*'Individuals can pivot or need to stay up well organisations don't always have the luxury to do it you know on a dime'*	Organizations cannot always afford to spend money for training.
	Dwayne	*'obviously the trade-offs of using consultants in terms of cost all those factors come into play so'*	Alternative to training investment is hiring low-cost IT consultants for short-term.
	Kevin	*'In all professional and non-professional areas sometimes, a certification is required'*	Obtaining certifications demands funding.
	Rajiv	*'I'm not so sure for the employee to attend this kind of conferences could be expensive unless the companies are sending it'*	Companies cannot afford to send every employee to technology conferences.

Table 3 quotes relevant to the vicious cycle due to resource limitations.

4.3.3 A deeper analysis of the vicious cycle due to entrapment

With regards to the third vicious cycle which has to do with the entrapment bias, the main contribution during the problematizing action research cycle came from the themes ‘long work hours’ and ‘getting buried in legacy technologies’. As a result, the code map depicted in Figure 9.0 was developed using the co-occurring codes with the above themes. Since this thematic map is based on the frequencies, it was necessary to repeat the similar content analysis activity as before.

The most relevant quotes collected during the data analysis in relation to the third vicious cycle has been arranged in Table 4, which demonstrates that individuals get entrapped either due to the faith that they will be rewarded at the end of the changing scenario. However, the discussions revealed that such organisation practices signal a toxic culture. Most participants who commented about this scenario suggested the entrapped individuals quit that work environment and start looking for a different job. Most importantly, one could always think of what is going to happen in the future of their career.

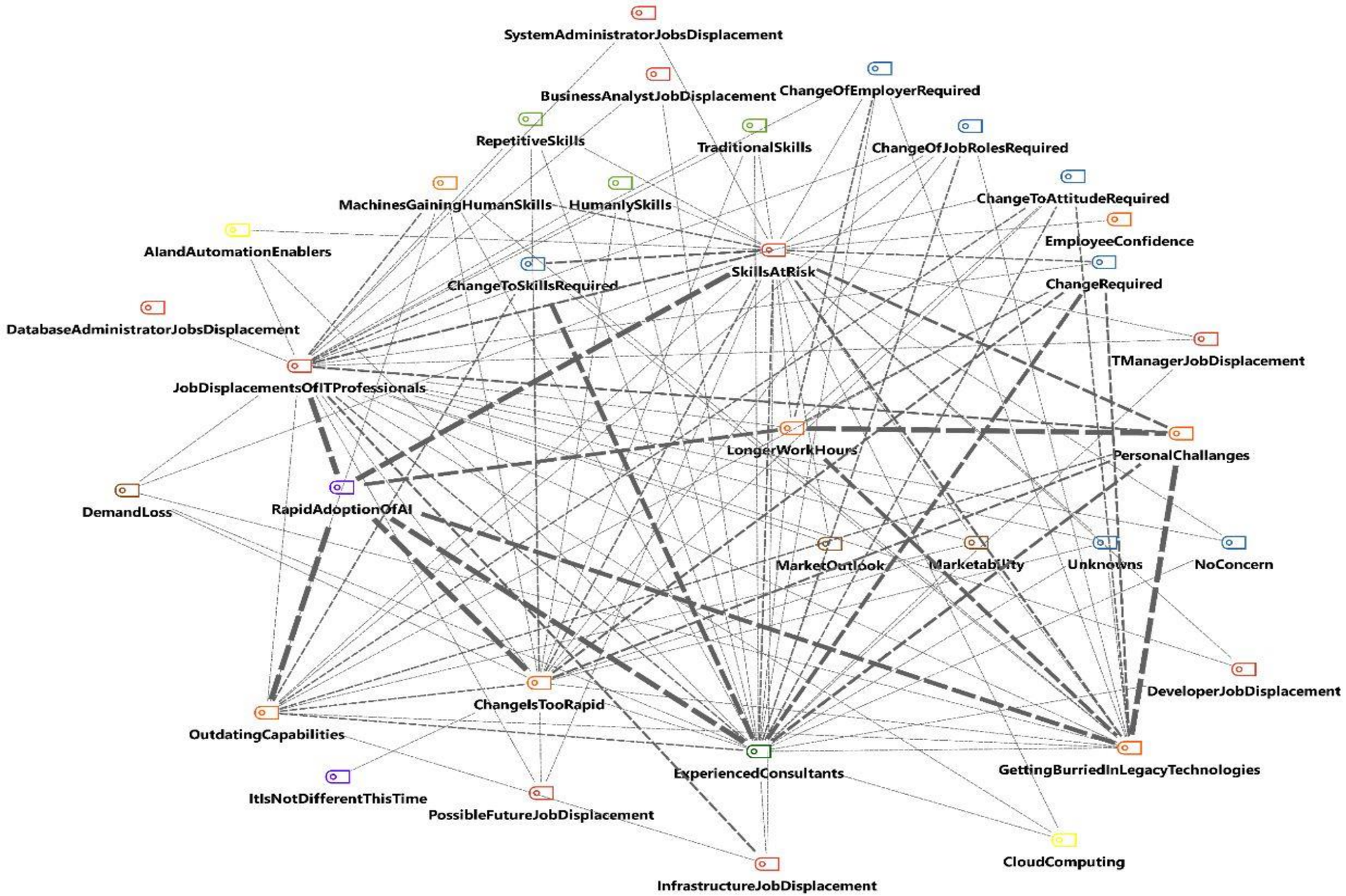

Figure 9.0 Code map depicting the co-occurrence of themes related to the vicious cycle due to entrapment.

Relevance	Participant	Quote	Implication
Getting entrapped in legacy skills	Patricia	*'People I've coached around this while I have talked around their resume is that exactly what they did. They were committed to the employer no matter what they know that this was going to be the end state of their job'.*	Many experienced IT professionals fall into entrapment due to inertia.
	Samson	*...I advise people in that situation to cut it lose quickly.'*	In an entrapment scenario, quitting that workstyle as soon as possible is advisable.
	Sriram	*This is what we call the toxic culture, right? If you are working for a company which has this kind of a toxic culture, I would suggest that you better look for a different place.'*	It is important to recognise the toxic organisation culture and avoid.
	Rajiv	*'you end up staying there and, you are waiting for this inevitable or maybe you are waiting for your package whatever the severance might be or whatever and maybe even company may have given their retention contract or whatever you don't go for two years will pay you X amount you just waiting'.*	People sometimes get entrapped because they anticipate some benefit before imminent job loss.
Longer work hours	Antonio	*'...in a situation like that, you know what's going to happen tomorrow. Take your time do not put more than 8 hours at your work. Because it's like meaningless right use this plus seven others for yourself.'*	One could be concerned about what will happen tomorrow.
	Kevin	*'I think that is myth that you should that you should be working so hard that you don't have enough time. You should be looking at a new job. That is career suicide. ... if you are so busy with the old job, that you know is coming to end, then you haven't been giving enough time for yourself to become successful. Why are you doing that?'*	One could start working on the next job if one started getting entrapped in legacy skills.

Table 4 quotes relevant to the vicious cycle due to entrapment.

4.4 Insights from data analysis towards developing an actionable model

As the second goal of the data analysis cycle, it was necessary to identify any insights, which were provided by the interview participants during the interview process on ways in which some conditions and behaviours can be changed towards navigating through the issue. When analysing the transcripts to generate insights for this purpose, the central focus was given to the theme codes, which were mostly focused on 'finding solutions' or 'areas of opportunity'. In so doing, several corrective actions or techniques could be identified. The interview participants did not provide implementation details of how such techniques can be used. However, the insights are useful in developing the context to build a workable action model.

4.4.1 Finding what is next after AI and automation

One of the most valuable insights from the data collection interviews was that finding opportunities for IT professionals to stay employed would necessarily need exploring what would happen after AI and automation. For any disruption of this nature, there is the aftermath, which has to be dealt with, according to Patricia. Hence, there can be opportunities that can be resulted from new problems created by the introduction of AI and automation. For example, Rasika says that *'they will create other problems, right and they may want to go to Mars, and maybe an entire migration to Mars, right? so who knows, right?'.* On the other hand, such technologies have their own issues as well, which needs to be fixed by technologists, according to Kevin.

4.4.2 Understanding where the demand is

Since a loss of demand is involved, as it was observed within the identified vicious cycles, it is essential to look at the emerging issue from a marketing point of view also. Then it comes to a question on how to segment, target and position IT professionals such as IT consultants in the market. In this regard, the most interesting marketing question is, where would the demand for IT skills will move? Sriram's belief is that for the next three years, cloud computing skill would be highly in-demand. Robotic Process Automation (RPA) is another area in which Sarath thinks that there will be potential for many years. Rajiv showed that AI and vulnerabilities created by over-enthusiastic developers could make cybersecurity a promising market to be in. The success

of AI depends on the data and its quality. As Narendra points out, there can be opportunities in data quality and data science-related work, particularly in the financial industry, where they have already started adopting AI and automation. Since these opportunities change over time, it is prudent for IT consultants to have a trend discovery mechanism to understand where the market is moving.

4.4.3 Increasing awareness of emerging technologies

Although artificial intelligence has been known to the world for many decades, the current implementations in cloud computing-based platforms are of emerging nature. In this technology domain, many species of new intelligent technologies are being invented and made available to be used as a service. Based on the findings so far in this research, such emerging technologies shape the type of work available to IT consultants in the coming years. Therefore, the need to increase awareness of emerging technologies is paramount. Although the future landscape is uncertain, those industry leaders who are working on defining the cutting-edge technology have to have some idea of where the technology will be moving. Therefore, it can be effective to follow the instincts of such leaders. Some participants revealed other possible resources for finding information that can predict the future path of emerging technologies. The use of big data analysis sources that can show the trends, newsfeeds that can provide the latest information on technology and low-cost online training platforms can be used to continuously keep oneself updated.

4.4.4 Building partnerships, gaining support from others and collaborative webs

In many complex problems, it is difficult trying to solve them alone. Often, it may be helpful to develop partnerships, gaining support from others. Collaborative webs are a sort of platforms that can facilitate such knowledge exchange (Swayer, 2007, p.179).

If someone involved in the consulting work wishes to constantly be informed about the emerging trends, Patricia suggests connecting and developing networks with people who are interested in what the future could be. According to her, before the internet, technologies in places like *'California street in Palo Alto'*, professionals established such connections while they went to have lunch at restaurants where professionals meet. In modern times, with the help of the

internet, collaborative webs can be established. Swayer (2007) describes several characteristics of such webs that can be effective. Out of those, the two characteristics; the frequent interactions, and having no single ownership [by large companies who have their agenda], can potentially create a safe environment to exchange knowledge to educate participants. Other than that, coaching platforms, search engines that can find support groups in particular industries can too introduce knowledge sharing. As Antonio reiterated, *'knowledge exchange, there's no better thing than one professional can offer to another one'*.

4.4.5 Creating new markets

When existing markets become saturated, or they do not look promising for a given skill, it is a good tactic to look for alternative markets. Rasika believes that being vigilant about the areas where companies are innovating and not milking the existing reputation would enable finding new potential markets. Once again, strategic surveillance mechanisms designed for individuals and firms can help to clarify the facts necessary to make such discoveries. For example, Channa says that 'Hackernews' can lead to such knowledge about the market in the San Francisco Bay area. There can be location-specific collaborative webs that can facilitate, understanding about where new markets can be created for consulting services.

4.4.6 Using negotiation

Negotiation is an essential skill that human intuition can use to compete against anything that can attempt to replace it. It is a soft skill that is required in future jobs dealing with customer needs, according to Linda. When it comes to the third vicious cycle due to entrapment bias, there were only two possible alternatives that anyone could propose. The first choice is to quit or avoid the situation by correctly assessing the situation as early as possible. The second most important technique, which was suggested by multiple individuals, was that one could apply negotiation abilities. Rajiv's advice to anyone who might decide to take the golden parachute [severance] and remain in the legacy technology platform while the modernisation is in progress is to negotiate the work agreements. Narendra makes an important observation that if a company has gotten rid of people so that it had to depend on the remaining people to commit 15 hours a day, that means *'they have already thin out the herd. They already took away every possible people they can'.*

4.4.7 Effective strategies, time management and effective learning tactics

When faced with competition, it is important to address the competition in a strategically sound manner. During the data collection phase, many individuals who have applied strategic approaches in their career have been interviewed. They brought multiple insights to the table during the discussions. It would be useful to explore some of these strategies and tactics.

IT professionals can look for the strategic alignment of everything they do; as a result, they have the potential to look for ways to align their skills to increase value to the company. This indication may even require the process of learning to use strategic approaches. One can first understand how they can reinforce on top of what they already know [does not mean legacy technology, but the direction of change] and then achieve targeted learning. The nature of the human brain, according to Sarath, is that it looks for immediate gratification. Learning things that can quickly bring results can help to keep the individuals motivated.

Another differentiating strategy suggested by Rasika is that identifying areas in which humans can perform better than machines and positioning skills around that area can bring about competitive advantage. For example, functions that involve emotional intelligence and more human aspects are the things that are most difficult for machines to achieve. On the other hand, if AI and other technology species evolving around that concept change too rapid without any stability, it would be extremely hard for companies to work according to a predictable technology roadmap. Therefore, natural selection would unfold abstractions. As it was discussed earlier, evidence of one such pattern formation was disclosed, that is the abstraction made by AWS Athena on various machine learning algorithms [an observation made by Sriram]. The technologists need to identify those emerging abstractions and try to align their learning paths along with those abstractions.

One of the critical challenges of the second vicious cycle is the need for monetary resources for skill development. Rajiv pointed out that some training that could otherwise be very expensive, can be obtained at the expense of the vendors of the products. It is a mutually beneficial tactic for both the IT consultant and the vendor. On the other hand, Channa believes that using the tactic of developing prototypes without incurring licensing costs can be cost-effective. One can come

with less risky adoption of new technology in projects while gaining knowledge. To him, it is like *'catching two birds with one stone'*.

For those who think that it is hard to find time to learn, the best strategy would be to use effective time management techniques. Kevin proposes that one could create routine daily life patterns which would introduce short spells of learning between other routine activities. Rajiv thinks that developing an attitude that believes that knowledge brings power, one who can get motivated to achieve power can try to find an extra hour every other day to learn [if it cannot be done daily] can create necessary time for learning. Reducing the learning curve by not devoting more than 2-three months to gaining any skills but expanding horizons by gaining knowledge that is sufficient to place one's self in the job would be an efficient tactic. Since it is hard to rely on one narrow skill in a disruptive situation, one can find multiple fits within the job market. Both Nimoy and Surya suggest finding between thirty to sixty minutes every day to spend for skill development as a mandatory requirement. For those professionals who find family responsibilities impacting skill development, an effective strategy would be to rely on online skill development activities, which can be done by spending an extra hour at work before leaving the workplace to come home.

When different competing technologies emerge, and when things change rapidly producing a lot of content that needs to be learnt, it is essential to bring efficiencies to managing knowledge. Kevin said that he uses a technology platform called *'Blinklist'* which helps readers to extract the essence from large books and summarise the important things to learn from the book. As a result, he does not have to spend much to read a whole book. Justin suggested that anyone who must spend time to drive every day could rely on audiobooks. Many individuals find it easier to drive while listening to an audiobook. When things change rapidly outdating knowledge, spending time in expensive classrooms can be less effective. Free online training available on YouTube [one needs to first explore the credibility of the poster] may be viewed while commuting in a bus, which is an effective strategy used by Rajiv. According to him, online universities are no longer *'looked down upon or frowned'* [many have seen the value of such means during the COVID-19 pandemic], as a result, anyone can afford to spend for a master's degree in machine learning can now accommodate such learning in asynchronous mode. Sriram stated that many world-class universities share one semester of free online classes on technology subjects to

anyone these days. Samson says that it would be more beneficial, using such material effectively giving enough time for the brain to incubate and adjust to the volume of knowledge coming in.

Organisations can facilitate the accumulation and quality validation of the free content and enable access to reliable online training available. It could also be possible to help the information flow between individuals, which would not happen otherwise. Rajiv also showed that some organisations that do not spend money on expensive real-world training, can now utilise virtual reality or augmented reality-based training. If the companies have a large number of employees, more opportunities can be given as a result of augmented reality simulations.

4.4.8 Learning in action

Technology is a moving target for Sriram. It is the reason why he thinks that self-learning is a necessity. *'Having people do way more real-life experimentation when trying to learn new behaviours as opposed to going to training classes'*, would be more effective in getting people into action, according to Patricia. Providing *'hands-on exposure in a safe environment'* would encourage people to get involved in learning-in-action, she adds. Rajiv uses the technique of developing proof of concepts (POC) for risky experiments. As a result, no one trying would burn their hands. For example, he did a POC project to try how the 'blockchain' technology can be used in KYC [know your customer in financial compliance] applications. From that, he could learn a lot about blockchain as a learning-in-action, although, it was never implemented for some other reasons. Similarly, Antonio had made it a habit to try new products and technologies and try to learn using many techniques. When he fails, he will try it in different ways until success is reached.

4.4.9 Changing roles

Among the experienced IT professional population, there are individuals who have been drifted away too far from being current about their technical skills, which could potentially make it impossible to regain modern technical skills. In such situations, it can be an alternative strategy for taking up different roles. For example, Namal thinks that they can take new roles which could allow them to *'be more consulting than actually doing the job'*. Inherently, engineers come with a lot of analytic skills. Surya points out another strategy that can be used by experienced

software engineers. Someone who has spent a reasonable time in the field of software engineering gains a lot of knowledge about the data. Such people have the potential to switch to *'data analytics jobs',* if they can pick the foundational knowledge to get into the job, and then perfect the skills while in the job.

4.4.10 Overcoming attitude issues

The research problem which has been explored in this thesis so far uncovered the existence of three vicious cycles. When overcoming these three different unfavourable situations, several external factors were considered as leverages. However, there is an important factor which contributes to all three vicious cycles which can only be addressed within. Experienced professionals over a period of time, develop certain ways of engaging in their practice what some people call as '*attitudes*'. These attitudes can sometimes hinder their ability to change. For example, if someone has reached to a higher level in the state of employment, and suddenly have to lose their ability to get to the same level of seniority, they find it difficult to get employed. When both experienced and inexperienced are disrupted by automation and AI, everyone has to accept that they need to wear the learner's hat. It requires a huge attitude change for an experienced to think like a novice. In some cases, experienced people have unlearned some old habits, according to Rajiv.

4.5 Gaps in understanding and the next steps

The data analysis cycle of this research revealed confirming evidence about the existence of three vicious cycles which had been identified during the problematizing cycle. The deep dive study unveiled many nuances to these vicious cycles. This chapter unfolded only the most critical findings of the overall data analysis. The research participants gave many insights that could be helpful in developing an actionable model which would facilitate the generation of managerial and personal actions. Some of these actions would involve addressing the attitude issues. Research participants revealed the need to address attitude issues, but after the analysis, I am still of the opinion that there needs to be some more additional acquisition of knowledge to be able to scientifically address the issue of attitude and behavioural change. The reason being the feedback from the participants lacked ways in which attitude issues can be addressed. Thus,

the next step of this research will explore the possibility of filling this knowledge gap using a comprehensive literature review done on the current body of knowledge on attitude and behavioural change.

Chapter Five – Review of literature

5.1 Introduction

For this comprehensive literature review, I have used many best practices from the methodological approach known as the 'systems approach' recommended by Levy and Ellis (2006). It outlines a proven, repeatable approach to systematically finding the relevant current body of knowledge based on the investigated themes. A scholarly management literature review is required to ensure that it synthesises content from academic journals that have gained a reputation for publishing quality peer-reviewed management articles. If an article is from one of the top-ranking management research journals (CABS, 2018), it was considered for inclusion with increased preference. Also, if those articles from the reputed journals have citations from other not so highly ranked journals, the original sources of such citations were also included in this review [even if the journal is not among the top rated], if their claims were found to be relevant to the matter under investigation in my thesis. In some cases, in this literature review, it was necessary to make indirect citations to those articles because access to the original source was not available via the online library of the University of Liverpool or other third-party sources like Research Gate and Google Scholar. Since the emerging phenomenon of the rapid adoption of AI and automation is relatively recent, some extra caution was taken to filter and collect the management research articles with continued relevance. Since the birth of the internet, organisation dynamics have changed drastically. Hence, most of the articles driving the body of knowledge referenced in this section have been published after the internet has become widely adopted in the USA. If any article that is more than twenty years has been cited, it is done so because it has been found to be still relevant as per other more recent publications that were considered relevant in this analysis. When searching for the right literature, a concept map was constructed to guide the selection of appropriate articles. The themes included in the concept map came up from the interviews without much detail available to generate necessary insights. The root concept of the map illustrated in Figure 10.0 emerged during the data analysis. However, the data analysis did not reveal that much of details on how to achieve change in the attitude of experienced IT professionals. All the other child concepts in this concept map represent gaps of understanding from the data analysis. I found that from the experience of the interview participants, these knowledge gaps could not be filled to

the level which is required by this research. As the next step, this concept map was used as the guideline for searching scholarly articles.

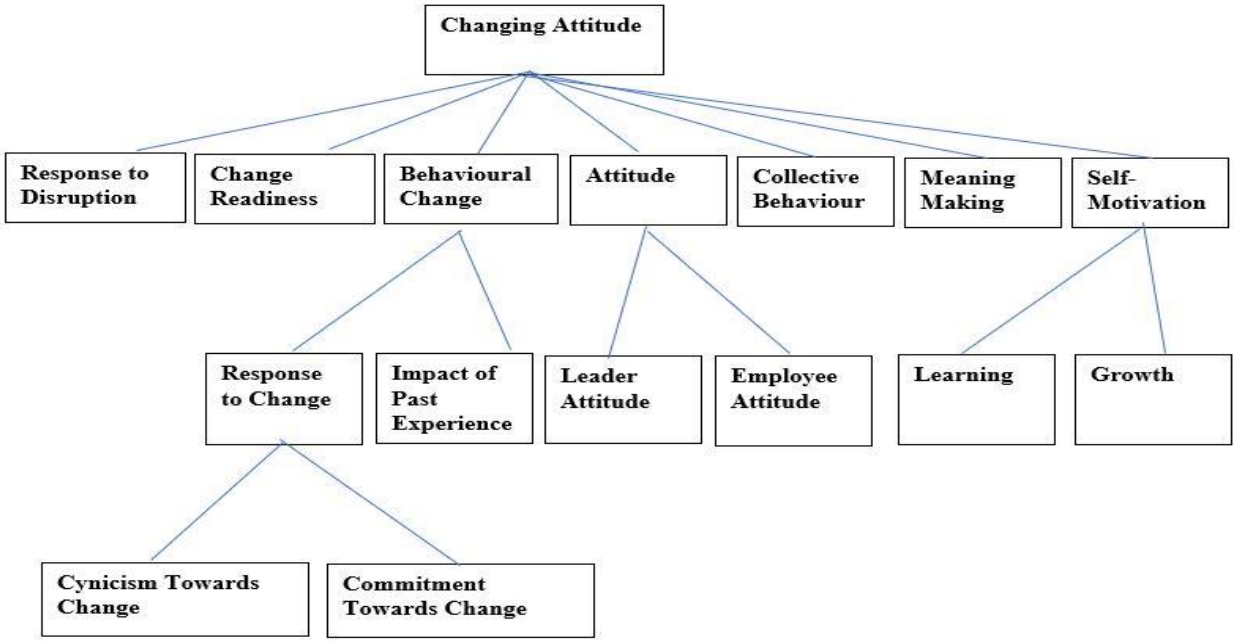

Figure 10.0 the concept map used for literature search.

Keyword search, forward search and backward search were attempted using the concept map shown in Figure 10.0. When doing a keywords search, I combined multiple words as a specific string as the input for search. When the search string is more specific, I found that the likelihood of finding more relevant articles was high. Then I applied additional filters on the numeric id of specific prominent journals. If I find out that my search string is too specific for it to return any potential matches, I eliminated one word at a time from the search string until I found the necessary matching articles. Being more specific in the search string helped me to narrow down the research articles more effectively. The goal was to shortlist about twenty most relevant scholarly articles that can cover the areas depicted in the concept map. The criteria of relevance included that the matter being discussed in the articles would relate to attitudes arising about individuals at work environments that are similar to that of the IT consultants and IT professionals in the USA. If it had to do with experienced professionals needing to change to be adaptable to the changing work demands, that too was considered as a strong criterion for inclusion. The keyword search led to

finding the initial set of literature. Then the backward search technique called 'previously used keywords' (Levy and Ellis, 2006) search led to finding most of the remaining articles.

Once the collection of articles has been shortlisted, I imported the articles into a new MAXQDA qualitative analysis project. In this project, an entirely new coding scheme was created. The analytical approach which was used is similar to what was used in the problematizing analysis and the data analysis cycles. During the coding process, while reviewing the content, four of the shortlisted articles were found to be out of relevance. For example, one article was excluded because it was based on a case related to introducing English to a workforce in a Latin American country, a situation that can be very different from what is faced by highly-skilled professionals during a rapidly emerging phenomenon which introduces completely new experiences that were never known before. Also, because the IT consultant facing job competition has become the unit of analysis of this research, the articles related to organisations trying to change to retain employees became strong candidates to be excluded. Therefore, the coding was completed with sixteen articles. Once the coding is complete, the quotes from the coding system that makes a meaningful relationship were extracted. Further manual review on the relationship forming quotes was done to derive the below articulated current body of knowledge.

5.2 Employee attitudes and related concepts

As it was revealed during the data analysis cycle, the emerging trend of artificial intelligence and modern automation being adopted ubiquitously in many industries is an episode of change that is not likely to be reversed. Those who are impacted and feeling disrupted in their careers might require some shifts to their attitudes along with many other changes that may be necessary to survive amidst the change. While the issue with attitude was widely discussed, a not much-organised body of knowledge could be retrieved during the data analysis. However, the extensive literature search unravelled relevant knowledge that can be used for the benefit of this research. This knowledge from the literature has been organised into ten subsections of section 5.2 containing multiple knowledge areas related to changing of the attitudes and behaviours of experienced professionals not limited to change readiness, change beliefs, psychological contract, cynicism towards change, and job-crafting. The knowledge which has been synthesised in these will later contribute to developing some of the foundational building blocks of the actionable model, which will be introduced in chapter six.

5.2.1 Change-related attitude and behaviour

While examining the employee's behaviour in the light of change, Sonenshein and Dholakia (2012) discussed the observations of early literature about change. It showed that the dominant response of employees to strategic change is resistance. This response is due to the uncertainty introduced by the change, which results in cautious behaviour by the employees, which is translated into resistance. As a result, such behaviour can be expected (Armenakis & Fredenberger, 1997). Theoretical understanding of the structure of attitudes reveals that the overall evaluative judgement is an attitude that comes due to the *'cognitive beliefs about an attitude object and affective reactions to an attitude object'* (Rafferty & Minbashian, 2019). In other words, attitudes usually manifest towards some other object such as politics, gender, minorities, etc. For example, in relation to the current problem being investigated, the attitude object would be the imminent change that is being demanded from the IT professionals. Hence, the understanding of the mindset of the individuals involved in a change is paramount.

The force that binds the individuals towards taking a course of actions that might be necessary to implement a change initiative successfully is a mindset called the *'commitment to change'* (Sonenshein & Dholakia, 2012). It comes in the form of three types, namely, the affective, continuance, and normative. The affective commitment which focuses on *'perceived inherent value of something'* happens due to *'desire'*. *'Continuance'* is a commitment to engage in the change because of rational calculations made about the perceived costs. Normative commitment, on the other hand, occurs due to the sense of the obligation or the duty. Out of the three, the affective commitment is the most vital at the time of *'adversity'* as it buffers the employees *'from the challenges of change'* (Ibid, p.6).

According to the prevailing theories, the attitudes can be a predictor of the resistance or supportive behaviour of change (Armenakis & Harris., 2002). When employees demonstrate a change supportive behaviour, it can manifest in three different forms that differ based on *'the amount of discretionary effort that an employee expends in support of an organisational change'*. *'Change compliance'* is the behaviour which they exhibit with no discretionary effort by the employee. Those who make modest sacrifices and going along with the change *'with the spirit of change'* are supposed to *'corporate'* with the change. Those who *'champion'* change exhibit considerable

personal sacrifices to promote change to others within and outside of the organisation (Herscovitch & Meyer, 2002).

In this research, the main interest is about the behaviour and attitude related to the episodic changes enforced on the IT professionals. Schwarz and Watson (2005) argue that when it comes to IT-related changes, the success of the change depends on the perception of the change affected employee on the group memberships and the interrelation with other groups. Beyer and Hannah (2002) suggest that when people consider themselves to be professionals, they usually develop personal identities associated with favourable social identities. In their theory, Schwarz and Watson (2005) recognise the employees as the group of organisation members who are responsible with *'commission, manage, coordinate, adopt and usag*e'. The systematic means through which they employ to comprehend the social world around them create the perception. Such activities involve *'categorisation, encompassing how individuals think about meaning and infer meaning from what occurs around them'* (Fiske and Tyler, cited in Schwarz and Watson 2005, p.290). Their perception about the oneness associated with belongings to a social aggregate [creating status quo] forms the social identity according to Schwarz and Watson (2005). In their view, the inertia towards change is typified by the "adaptive change existing along a sliding scale of change to the status quo, dependant on the situation" (Ibid, p.290). According to Mintzberg and Westley, organisations need to change because if they don't, they will go out of synchronisation with the environment. At the same time, if the organisations cannot come to stabilisation after the change, it can never efficiently produce products and services (Mintzberg & Westley, 1992). Although historically employees relied on the constancy of identity during change, in the modern world under knowledge economy, with an increased reliance of information intensity, such assumptions may be questionable. In such situations, employees have more independence and job alternatives. Therefore, the issues related to identity have a special interest because there can be several competing identities (Schwarz & Watson, 2005).

Among those attitudes resulting in change-resistant behaviour is the cynicism towards change (CTC). According to DeCelles et al. (2013), past research has conceptualised CTC as an attitude. It is a quite common behaviour found in most organisations trying to achieve change. It can result in employees who can go to the extent of sabotaging the change (Vance et al., cited in DeCelles et al. 2013). CTC may not necessarily exist in the form of an individual attitude alone. It may exist

in the form of an organisational level attitude or a *'climate'* (Schneider and Reichers, 1983). Organisational norms and expectations about the attitudes of employees are established within the organisation climates. Also, the practices, procedures and the behaviours that are expected, supported or rewarded are also concerns of the organisation climate (DeCelles et al., 2013, p.156).

The cynicism towards change climate gets developed when individuals within the organisations collectively create meaning by sharing their perspectives with others in the organisation. In other words, these shared meanings of the *'climate'* can be referred to as particular *'collective beliefs or attitudes about a specific and psychologically important aspect'* according to many publications related to previous research (DeCelles et al., 2013). When organisational cynicism occurs in this climate, negative attitudes relating to *'unmet expectations of authorities or society'* may become prevalent. Past research had attempted to conceptualise it as 'mistrust and lost pride in one's work or occupation' or even as 'an attitude of frustration and distrust toward one's organization' (Ibid, p.156).

During organisational level cynicism towards change, individuals communicate about their own experiences as well as their beliefs about the organisation's ability to successfully implement the change. The individual's own meaning gets altered depending on the type of interactions which the individual establishes with the surrounding environment. If that environment consists of optimistic views about the organisation, the meaning that climate creates on that individual could be quite different from what would otherwise be resulted from the *'pessimistic cues to employees about the (low) likelihood of improvement in their organisation'* (DeCelles et al., 2013, p.155). For example, when an employee with an individual cynicism receives such pessimistic cues, the surrounding CTC climate could *'amplify the corrosive effects of employee CTC'* (DeCelles et al., 2013).

5.2.2 Attitude and change readiness

Amongst the change related attitudes, one of the most important ones is the change readiness attitude. It is defined as 'an individual's *'beliefs, attitudes, and intentions regarding the extent to which changes are needed and the organisation's capacity to successfully undertake those changes'* (Armenakis et al., 1993). Understanding about developing change readiness within individuals is important because developing that attitude has to become a foundational goal of the

actionable model, which will be developed during this research. It has to be a foundational goal because it is *'a main determinant of the extent to which any change can succeed'* (Oreg et al., 2011).

When individuals are faced with ambiguity related to change, especially when the status quo has to change, they begin to feel about the lack of control. Therefore, tolerance for lack of control needs to be developed towards achieving change readiness (Walinga, 2008). This attitude is essential in creating a willingness to accept the uncertainties inherent to the change and perceiving that the change is controllable; as a result, positive outcomes can be achieved (Ibid, p.838).

Rafferty and Minbashian (2019) identified change readiness as a predictor of whether employees will show a change supportive behaviour. Although, Armenakis and colleagues earlier believed that 'readiness is the cognitive precursor of the behaviors of either resistance to, or support for, a change effort', this recent work of Rafferty and Minbashian recognises *'change readiness as a mediator of relationships among the change beliefs and positive emotions about change and change-supportive behaviours'* (Ibid, p.1624). According to them, attitudes have a link to emotions. For example, the affective component of the attitude has been defined by the researchers as *'the emotions and drives that are engendered by a specific attitude object'* (Breckler and Wiggins, cited in Rafferty and Minbashian 2019). Hence, the assessment of the affective component of the change readiness has to be done using the discrete emotion items captured from the positive emotions of an individual related to a particular change event. Researchers have explored several such emotions such as *'pleasure about change'*, '*self-oriented value of a stimulus', 'happiness', 'excitement'* and *'pride'*.

5.2.3 Emotional aspects of change-related behavioural attitudes

Previous research in psychology research has revealed that *'growth'* is a critical factor that employees consider as a *'core value'* (Schwartz, cited in Sonenshein et al. 2012; Sheldon et al., 2001). Therefore, employees seek context and activities that encourage growth. Because it provides structure and meaning to their experiences, the sense of growth helps to achieve psychological well-being. The self-knowledge achieved through this mechanism helps to adapt to social life and enhance the ability function (Sonenshein et al., 2013). According to the findings of Sonenshein and Dholakia (2012), the models used by social psychology researchers reveal that it

is essential for the individuals to find an explanation for the events and to do that they might create attributions and link events to a *'world-views/value system'* in the process of understanding the event. Also, it is essential for individuals to identify *'more benefits than downsides of the event'* (Ibid, p.2). When it comes to benefits finding, the positive emotions might be necessary to reappraise negative events as positive therefore several researchers viewed it as *'thoughtful reappraisals', 'broadening of thought–action repertoires', and 'positive illusions effect'* (Sonenshein and Dholakia, 2012). When understanding positive emotions, Sonenshein and Dholakia (2012) focused on high-activation positive emotions *'energy, optimism, and confidence'* that can promote generating action. To them, what is meant by *'benefits finding'* is the extent to which individuals weigh change as having more benefits against downsides while 'constructing change with positive emotions' (Ibid, p.4).

According to DeCelles et al. (2013), the transformational leaders use a strategy of *'psychologically empowering' their followers'* which can help to negate the effects of employee cynicism about change. Psychological empowerment has to do with *'employees' experienced feelings of meaningfulness, competence, self-determination, and impact'* (Spreitzer, 1995). When transformation leaders make decisions, they consult their employees in a manner which encourages their subordinates to take responsibility for their work. As a result, employees will start to believe that their actions will have an impact. That increases the likelihood of change supportive behaviour by the employees, and therefore, the employees will put extra effort to ensure that the change will become successful. This behaviour is a complete opposite to the employee cynicism towards change (Ibid, p.157).

McNatt and Judge (2008) show that those employees who have a higher self-efficacy find that their sense of helplessness is less, as a result, they are more involved with the job and provides more organisational commitment. Past research suggests that *'interest is the most prevalent motivational condition for the day-to-day functioning of normal human beings, and is very important in the development of skills and competencies'* (Izard, cited in Rafferty and Minbashian 2019). Since the interest generates the experience of *'feeling of being engaged, caught up'* or become *'fascinated or curious'*, it results in the tendency of 'wanting to investigate**,** *become involved in, or expand the self by incorporating new information and having new experiences with the person or object that stimulated the interest'* (Rafferty and Minbashian, 2019, p.1626). When

developing professional commitment, the development of self-efficacy appears to be rewarding, because when employees understand that time, resources and efforts are spent for the sake to help their adjustment, they become wanting to re-pay the organisation. Sometimes, employees make decision choices related to their environment based on their self-efficacy (Bandura, cited in McNatt and Judge 2008). For example, an employee who is weak in self-efficacy might decide to call in sick before deciding to quit the job. Quite the opposite to this behaviour, an employee with high self-efficacy would handle the work-related stress occurring from surprises and disappointment. People with higher self-efficacy believe that their effort can make an impact. As a result, they are inclined to be more proactive about resolving problems. Also, it can partly help improving employees' job-related attitudes because it has the potential to help people to deal with anxiety and stress.

5.2.4 The effect of psychological contract on attitude towards change

The concepts discussed so far has been confirming that individuals evaluate the events, environments when they develop positive or negative emotions about their jobs. The psychological contract is a concept understood by researchers as having to do with *'individual beliefs in reciprocal obligations between employees and employers'* (Rousseau, 1990). These beliefs shape a bidirectional sense of obligation that the organisation had promised certain inducements such as promotions, autonomy or competitive wages in return for contribution from the employee. Not just during the entry to the job but also during training, performance appraisals, and during the execution of rewarding practices, such beliefs can be established (Kiazad et al., 2019, p.1316). When employees believe that their psychological contracts have been fulfilled, they seem to exhibit positive work attitudes and better performance (Ibid, p.1316). Since the employee understands that some psychological and transactional benefits have to be sacrificed if one decides to leave the job, it appears to create a motivation to stay and perform. Thus, it causes job embeddedness which was understood as an *'anti-withdrawal construct'* by the early scholars (March and Simon, cited in Kiazad et al. 2019). When employees are sacrifice embedded, they demonstrate organisation citizenship behaviours or demonstrate innovativeness to develop goodwill within their organisation as they feel that they have too much to sacrifice if they have to leave.

Job embeddedness related studies identify three influencing forces which could affect employee retention and performance. They are known as *'links'*, *'fits'* and *'sacrifices'* (Kiazad et al., 2019). Individuals form links by establishing a connection between the institution and other persons in a formal and informal manner. The perceived compatibility or job comfort is understood as the fit. Sacrifices can be understood as 'the perceived cost of material or psychological benefits that may be forfeited by leaving a job' (Kiazad et al., 2019). Strong connections make it easier to stay and perform. As a result, sacrifice embedded employee tend to exhibit extra-role behaviour when they are involved in such connections. Such extra-role behaviour can come in the form of organisational citizenship behaviours or innovativeness due to the timely access to information, support and influence. However, it is not the same when sacrifice embedded employees lack links. Their motivation for extra-role behaviour would be less because they would not attempt to risk the benefits as they do not want to make those sacrifices (Ibid, p.1320). While sacrifices such as benefits that might be foregone in the event of an exit from the job might retain the employee, it is not likely to induce extra-role behaviour without links or fits (Ibid, p.1319). When the psychological contract is fulfilled, it grows the sacrifices; as a result, it improves the motivation for extra-role related performance. When the employee has a better job fit in the form of job demands our organisational values coupled with strong ties with colleagues, this effect can become even stronger (Ibid, p.1315).

When it comes to how employees reciprocate in relation to the psychological contract, they show different responses to fulfilment and failure by the organisation. When an organisation simply fulfils the psychological contract, it occurs as it was initially assumed by the employee. In such cases, the reciprocity would be normal. When an organisation fails to fulfil promises unexpectedly, employees are more likely to demonstrate negative reciprocity. It could manifest as '*hot negative emotions characterised by the violation'* (Kiazad et al., 2019, p.1316). It is a behaviour which appears to be consistent with the long-understood response leading to a stronger emotional response to negative events than to positive events.

5.2.5 The role of change belief in shaping the attitude towards change readiness

Change beliefs are a set of cognitive beliefs that will be critically targeted during any change related communication. Rafferty and Minbashian state that they are *'most-proximal antecedents of change-readiness attitude'* (2019, p.1625). According to people who research about attitude,

the behaviour is influenced by the affective or the emotional component of attitude rather than general evaluation (Millar and Tesser, 1986). Similarly, Rafferty and Minbashian (2019) find a direct relationship between positive emotions about the change and five change beliefs to change-supportive behaviour. Beyer and Hannah (2002) emphasised the importance of belief systems helping individuals to cope up with change-related situations, and they list several past research works which examined how cultures provide *'accepted belief systems, norms, and values that prescribe how to deal with those uncertainties'*. For example, a study which involved people from an engineering subculture [which is highly relevant to the sub-culture of the IT consultants] showed how that industry provided a wealth of information to deal with an endemic situation in their industries (Schein, cited in Beyer and Hannah 2002). The respondents in the research of Beyer and Hannah (2002), quite commonly referred to personal characteristics reflected in their skills in previous and current jobs. In a similar response, the participants of my data collection activities too talked about a *'baggage'* [an aggregation of outdated experience carried from one job to another] frequently. Also, the fact that IT professionals carry identities from one job to another [being a Java developer, Oracle database administrator, etc.] resonates with observations from Beyer and Hannah (2002). Such identities can form a barrier if the foundational skills behind such identities go out of demand.

As it was previously identified, developing change-readiness attitude will be essential to construct the foundational aspects of the actionable model design. Since any behavioural change [as identified during the data analysis] requires stimulus, it has to happen by activating the affective or the emotional components of the change-attitude. Hence the design of the actionable model would closely explore how it can utilise the five change beliefs. Rafferty and Minbashian (2019) provide a reasonable analysis of these five beliefs. According to them, the first belief is known as ***'discrepancy'***, a belief that gives rise to the recognition of legitimate reasons or discrepancies in the present state compared to the desired state. Secondly, the individuals have to believe that the change intervention is an appropriate response to the situation, giving rise to the ***'appropriateness'*** change belief. Thirdly, the individual's *'perceived capability to implement a change initiative'* called the change-related self-efficacy becomes critical. It gives rise to the ***'change self-efficacy'*** belief. Self-efficacy belief may be brought up from several types of information cues (Bandura, cited in Vardaman et al. 2012). These cues can originate as a result of observing the actions of others. The verbal signals targeting to persuade individuals belief of self-efficacy, *'experience*

*through proxy by modelling other's behaviours***,** *and enactive learning through repeated task execution'* are some of the other forms of cues that can help developing change self-efficacy (Vardaman et al., 2012). Also, the seven dispositional traits understood by Judge et *al.*, which predicts the coping of change. The findings made by Wanberg and Banas that the *'personal resilience (self-esteem, optimism, and perceived control) predicted acceptance of change'* (Sonenshein and Dholakia, 2012), resonates with the idea that belief of self-efficacy is essential for change readiness.

Earlier work of several other researchers (Armenakis et al., 1999; Armenakis et al., 2007) have found that support from formal leaders and informal leaders, including peers, can influence the change attitudes and response towards change (Rafferty and Minbashian, 2019). Hence, the ***'principal support',*** change belief is defined as the individual's belief that support is available from the *'formal organisational leaders such as senior leaders, immediate supervisors and one's own peers'* (Rafferty and Minbashian, p.1626). It is quite notable the importance given here to the support from the peers. That is quite in agreement with the observation of Sonenshein and Dholakia (2012) that why researchers are encouraged to give enough attention *to 'also how employees give sense and influence one another'* (Ibid, p.17) because not only managers but also peers can influence the employees. The opposite behaviour of change acceptance is the cynicism towards change. From the perspective of reducing the cynicism towards change, the role of the leader's support is essential. When the leader is using the transformational leadership style, it helps to change the *'basic values, beliefs and attitudes'* of the followers. That is possible because the transformational leader intellectually stimulates the followers and provides necessary vision, alignment of goals, performance expectations, an appropriate model for behaviour and individual support (DeCelles et al., 2013).

The fifth change belief, called ***'valance'*** (Rafferty and Minbashian, 2019) involves the individual's belief that the change would deliver intrinsic or extrinsic benefits to the individual. In this case, the individual's valance *'addresses the perceived benefits of a change for an individual'* (Holt et al., cited in Rafferty and Minbashian 2019). According to Rider and Negro (2015), two factors are determining an employee's bargaining power. It depends on *'the organisation's dependence on an individual for labor and the individual's dependence on the organisation for employment'*. Therefore, the chance of an employee gaining higher status

improves depending on *'the value that potential employers place on his or her labor and with the value of his or her current position'* (Rider and Negro, 2015, p.634). In this case, if the employee's individual's valance related to the change [such as benefits of gaining new skills] is assessed in terms of whether a higher status can be obtained due to change, its potential to develop towards a psychological contract fulfilment depends on how realistic that expectation based on the above bargaining power within the current employment environment.

5.2.6 The employee's and the leader's attitudes towards change

During the data analysis cycle, it was evident that in many situations, it was advisable for the IT professionals to undergo an attitude change. From a state of mind that does not cultivate change readiness, one is required to find ways to change to a state where the self-beliefs and the contextual factors [work or the job itself] becomes helpful to become more change supportive. Hence, in this section, some effort will be made to understand how employees and leaders understand ambiguity, work with other collaborative participation, and even crafting their job or the role to enable change-related adaptiveness.

McNatt and Judge (2008) noted the effect of people being able to regulate what they think; as a result, how it can influence the way they feel and behave. They claim that those who find potentially undesirable or threatening situations as controllable do so because of them conjuring the situation in their mind and facing it with a positive attitude. Through self-efficacy, it is possible to influence affective or attitudinal outcomes via *'cognitive and action-oriented responses to anxiety and coping'* (McNatt and Judge, 2008, p.786). Handling undesirable or threatening situations filled with ambiguity without requiring to have things defined in the form of 'black or white' is a characteristic of good leadership. Hence Solberg and Wong (2016) claim that requiring structure is a failure by the leaders to adapt to the situation. In ambiguous change situations, the ability to perceive change as controllable is likely to produce positive outcomes about the change; as a result, it is an essential factor to develop change readiness attitude (Vardaman et al., 2012). Based on Walinga's observations from North American Soccer Team [in 2008], it is important for the change recipients to have the 'power to adapt', rather than to have the 'power over change' (Walinga, 2008). Tolerance of lack of control and the interpretation of control are not the same concept, according to Vardaman et al. (2012). According to them, one can have both states simultaneously, and one's centeredness in social networks is likely to increase resilience due to

access to support via the network. Before and after the change, people with social support have shown better tolerance for lack of control. Network centrality, however, shows an indirect relationship to the interpretation of the change as controllable. It is the change related self-efficacy, which results from the network centrality [connectedness] with social support that creates a strong mediation effect on the interpretation of the change as controllable (Vardaman et al., 2012, p.849). In other words, *'social support and efficacy that is provided by friendships are very important during change'* (Ibid, p.848). These observations about the effect of network centrality on change related attitudes have an important implication for *'effectuating change* initiatives' that has not previously been explored in research. That is *'creating dense webs of friendship and advice relationships allows change recipients to make sense of change and interpret change issues as controllable'.* Through such linkages, it *'brings the role of social interaction, social support, and mentoring to the fore of understanding how change is effectuated in organizations'. This* claim by Vardaman et al. (2012) is very much in agreement with what Patricia said during the data collection interviews about creating *'collaborative webs'* to increase mutual support between technologists. In addition to relying on friends, individuals can use the formal networks available at work that provides necessary information. Some organisations provide mentoring support assigning senior leaders as mentors for junior employees. However, when designing such support networks, top-down only information flow does not appear to be that effective. It happens because it does not foster a sense of belonging to the junior member (Kram, cited in Vardaman et al. 2012).

While self-efficacy belief is essential in multiple ways, its impact is very subjective. The self-belief on how to act in a given situation is likely to depend on the information available in the social network and how the support is delivered for being a central member. Therefore, the belief in efficacy may not be interpreted as a generalised feeling of mastery. Instead, it can be tied to specific situations or behaviour (Vardaman et al., 2012).

Lack of controllability demonstrates counterproductive behaviours such as *'procrastination, disengagement, or avoidance'* (Strong et al., 1979). In contrast, when change is understood as controllable, more effective implementations of change, opportunity recognition, and the presence of high performance during and after change could be observed (Ibid, p.836). Efficacious individuals do not consider change situations as traps; rather, they make it a learning opportunity

and treat it as an opportunity to demonstrate their skills rather than being threatened. As a result, they develop better *'psychological well-being and job-satisfaction'* (Vardaman et al., 2012).

Working on improving the change beliefs in relation to increasing change readiness is an approach that focuses on transforming the attitudes of individuals into becoming efficacious. There are some instances where it may be necessary to alter the environmental context so that one can find enough room to make the necessary adjustment to the change. Sometimes the role and personal life-related stressors can hinder an employee's ability to find sufficient resources to adapt. For example, during the problematizing lifecycle of this thesis research, it was revealed that in some organisations, when modern technology trends are embraced, those jobs that had to do with legacy technologies get eliminated. Some experienced highly-skilled individuals [in legacy technologies] get entrapped in their same old work style without being able to find time to adapt to the new technologies. Within the new context, the experience individual may not be an ideal fit. However, given the opportunity, with the experience, one can adapt. The question is, organisation strategies normally do not get custom-tailored to address issues with individual employees. However, under leaders who are flexible, employees can apply a behavioural tactic called *'job crafting'* (Niessen et al., 2016) as a mechanism to informally alter their job to allow them to increase their fitness to the environment. However, unlike personal initiatives of individuals that are based on futuristic visions with a focus on longer-term, job crafting does not focus on serving organisational goals and solving problems. Instead, *'employees can change formerly constructed job roles by changing task and relational boundaries of the job in order to change work meaning and work identity'* (Niessen et al., 2016). Individuals use three different types of job crafting, called *'task crafting'*, *'relational crafting'* and *'cognitive crafting'*. Those individuals who craft the tasks can alter the scope or the means of task accomplishment to model the work which they have to achieve at work. That makes it possible to undertake more or less work. The employees can also decide on the level of social interaction. That means deciding with whom to interact in an intense manner while performing the duties. That is how relational crafting is achieved. Cognitive crafting deals with cognitive re-framing about how one understands about the work being performed (Wzresniewski and Dutton, cited in Niessen et al. 2016). Cognitive crafting has been categorised as an avoidance coping by some researchers, however, in the view of Niessen et al. (2016), it can be a useful way of achieving *'fit with the work environment through changing the meaning of work and work identities'*. For those professionals who had senior roles who have to work in more junior roles as

a result of job displacement, might find cognitive crafting as a useful mechanism to develop a learning-attitude when the situation demands it. The other two forms of crafting can help the individuals the room to adapt to the changing situation.

For job-crafting to be possible, there has to be some leader's support or tolerance. It is a fundamental premise of job-crafting theory that to which extent a job can be crafted depends on the leader. When leaders provide sufficient autonomy, opportunity by creating the appropriate context, employees can do the task and relational job crafting (Solberg and Wong, 2016). Same way, when leaders monitor their employees too closely, it can hinder the perceived opportunity to craft the job by the employees.

The vicious cycles which were identified during the problematizing cycle signalled that in certain work environments where legacy systems are being replaced by modern technologies, too much of work get assigned to the remaining employees who survived layoffs. That alone can reduce the resources available to the employees to devote to their career development. Solberg and Wong (2016) highlight many academic research activities naming this situation as 'role-overload'. According to them, job-crafting may be possible during role-overload scenarios as well. But its success depends on the extent to which the leader demands structure and the fit between the employees own adaptivity and the adaptive preferences of their leader. Such task autonomy, coupled with employee's proactive acquisition of more responsibilities, can potentially create an environment where role-overloading can be taken as a challenge instead of hindering job demand.

5.2.7 Learning attitude and the attitude towards self-growth

It has been repeatedly observed during the problematizing and data analysis effort that individual learning and growth is in the critical path to success in dealing with the issues arising from the rapid adoption of AI and automation. Hence, it is important to understand the attitude related to individual learning and self-growth. Scholastic research defines individual learning as changes to the individual knowledge and collective learning as the changes to the collective knowledge (Argote, 2013). The learning process involves the cognitive and social processes associated with learning. The transactive memory system (TMS) theory related studies have explored the learning behaviour in organisational settings. These studies have shown that both the individual and collective learning processes are intertwined such that individual learning affects collective

learning and vice-versa. According to TMS theory, the collaborative activities of group members result in encoding, interpretation and recollection of information to occur as a collective effort. As a result, it constructs knowledge which is embedded in the group's structures and processes. It shapes *'what and how much, group members learn'* (Anderson and Lewis, 2014).

Learning is a process that involves people engaging in creating differences in their knowledge with new knowledge. In the IT industry, new technologies quite often create disruptions that make paradigm shifts. When understanding the effects of disruptions on learning, Anderson and Lewis (2014) claim that during most disruptions, performance gets impacted temporarily. However, some disruptions can permanently reduce performance. Some disruptions have the ability to create a positive effect in the long run on the performance. It all depends on the type of disruptions. In particular, this research gives a focus to the disruption that occurs to the individual IT professionals who have gained about fifteen to twenty years of experience. The traditional studies of the learning curve reveal that learning from experience is beneficial to organisational performance in the long run (Argote, 2013; Dutton and Thomas, 1984; Yelle, 1979). However, several other works of literature seem to show an opposing view to that. According to that literature, the experience can at times create rigidities that can *'disrupt learning and harm performance'* (Leonard-Barton, 1992; Levitt and March, 1988; March, 1991; Tushman and Romanelli, 1985). The recent observations from Anderson and Lewis (2014) show that both views are correct under different conditions. The experience can cause issues, as suggested by previous research, when the experience becomes too specialised. This observation gives a critical insight for the design of the actionable model such that it discourages over specialisation of skills [during the data collection phase, Sriram suggested not spending too much time on learning one single thing].

One of the other challenges related to the learning from experience is that such knowledge in individuals can depreciate. The depreciation can happen in multiple ways. When employees leave the organisation, it can create knowledge gaps. When products and process changes happen, the knowledge can become obsolete [which is the most relevant scenario of depreciation in the light of AI and automation]. Individuals can forget the knowledge which they accumulated in the past, or they may become unable to encode new knowledge into their long-term memory. Whether knowledge can depreciate depends on the type of knowledge as well. However, when it comes to collective learning, knowledge does not easily depreciate (Anderson and Lewis, 2014).

The research of Lawrence (2018), which examined the effects of prior experience suggests that old practices learnt through experience can lead to competency traps. In this regard, previous literature suggests that introducing slow learners into the team can alleviate that risk (March, 1991). However, Lawrence (2018) does not believe that it will be a permanent solution because those slow learners will eventually become learners with prior experience.

Learning and growth have a similar meaning in organisational environments. Sonenshein et al. (2012) cite Lave and Wenger (1991) as equating learning to growth. The process of becoming an insider involves learning in a community. However, in their literature, they unfolded three different growing types called *'achieving, learning, and helping'* (Sonenshein et al., 2012, p.553). When people interpret growth, they associate it through their past experiences [personal histories] as well as work activities. For example, Sonenshein et al. (2012) identified an individual who worked in a hazardous environment where, surprisingly, not much structure was enforced by the leaders; self-learnt to avoid mistakes and accidents. Nevertheless, that was possible for the employee because his manager allowed a safe learning environment for him through which the employee could find an opportunity to grow as an independent contributor.

When learning amounts to growth, it has to create a difference in knowledge. If so, whether staying in the same job, doing the same thing for a long time would provide growth is questionable. Beyer and Hannah (2002) claim that when a new job brings new demands, new ways of thinking and behaving provides new learning opportunities. However, chances are fewer if one gets a series of similar jobs. This observation has strong implications for certain types of consultancy jobs, such as database administration, where the type of work does not change much, even if the job changes. Therefore, to IT consultants who can find jobs that can make them do different things, it provides a better chance of growth via learning. When experience demonstrates a diversity of skills, employees can *'acquire a variety of personal resources that can be helpful in the future'* (Beyer and Hannah, 2002).

5.2.8 Change-related learning and collective behaviour

Previously it was discussed that learning is a form of growth as perceived by the individuals. Understanding the learning behaviour through models based on power-law driven learning curves may not be accurate enough to describe the education happening in collective groups, according

to Anderson and Lewis (2014). They found that disruptions occurring to the collective learning may become detrimental to the organisation, although, disruptions happening to individual learning can have a better effect in the long run.

When the same practices are repeated in collective groups, even if its members leave, or new ones are added, the knowledge retained in the network can remain intact. Over a period, it may also show competency traps, or rigidities making it difficult to adapt to new practices. They show a decreased ability to retain new knowledge within the group due to the prevailing knowledge of the status quo (Lawrence, 2018). When the same people work in the same practices for a very long-time, it is natural for them to establish *'truces'* about how the work could be done. That may work effectively as long as stable practices exist. In a situation like what is being explored in this thesis, such structures will be challenged. As Lawrence (2018) further pointed out, such legacy structures face costly changes when faced with novelty. Interestingly the so-called *'baggage'* [the legacy experience which individuals accumulate], which was frequently mentioned during the research interview stage, has been considered as detrimental by Lawrence (2018), not only to those who change the job but also to the ones who remain in the same role for a very long time.

Srivastava (2015) explains that when the ambiguity is heightened, people tend to seek help from others to understand what is going on. The reason for such ambiguity is that, when there are competing interpretations of the event, it creates a shock of confusion. The individual under this shock sees multiple interpretations of the same situation (Ibid, p.1367). That is because it is necessary for them to know what the change situation means to them. Quite often, they seek opinion on how to respond. The upward and downward pressure created in the individual's contacts creates interesting behaviour, according to Srivastava. When people seek diversity of opinions, it increases network diversity; while the network diversity gets reduced when people tend to rely on familiar and trustworthy contacts. These contacts exist in formal-networks, semi-formal networks and informal networks. Srivastava (2015) argues that when ambiguity arises, people rely less on formal network ties and decrease communication with them if they do not have a significant semi-formal component. Instead, they would try to increase communication with semi-formal network ties without significant formal component and increase communication with informal network ties.

When change events occur, employees involve in collective sensemaking. It can result in *'similarity in viewpoints'* (Weick et al., 2005). According to *'attraction–selection–attrition theory'* (Schneider, 1987, p.440), employees with similar attitudes are likely to get attracted and engaged together. When homogeneous views get created, particularly the one that supports cynicism towards change, that trend can reinforce the climate of cynicism towards change (DeCelles et al., 2013).

Existing practices embedded in the knowledge networks leave well established mental models about how work could be done. These mental models can obstruct the recognition of new learning. For a long time, through Lewin's change model (Lewin and Cartwright,1951), it was known that an 'unfreezing' is required before implementing a change. Similarly, before such new learning can occur, it may be necessary to 'unlearn' some of the old practices when old knowledge becomes obsolete (Lawrence, 2018).

5.2.9 Impact of past-experience and accumulation of knowledge on attitude towards change

The existing skills becoming obsolete has been identified during this research as a critical issue faced by the experienced IT professionals during the emerging phenomenon of the rapid adoption of AI and automation. So far, how the experience can amount to rigidities that hinder the acquisition of new knowledge during disruption has been examined. For example, Lawrence (2018) observed that teams with experienced team members performed worse during the observations of that research. Nevertheless, as a result of working together for a long-time, they had tacit knowledge of whom to reach to and how to use resources better; as a result, their path to improvement was quicker. This observation is a good insight for organisations wanting to rely on the existing experienced staff for novel initiatives.

When organisation climate does not help the experienced individuals who are overloaded, it is essential to evaluate the cost of losing the job at this stage? Understanding that could lead to the realisation of whether any shifts in attitude about sticking with the familiar roles is necessary within the current environment. Rider and Negro (2015) explored the impact of an organisation failure on experienced lawyers in finding their next job. Their findings revealed that failures in the previous organisation could cast doubts on the displaced employee's ability to become

successful in the next job. While this theory's generalisability may be relevant to certain types of jobs, it is interesting to find out whether the effect will be the same on most technology jobs. The relevance of track record [of the organisation] and the validity of associating an organisation failure to an individual may not be justified if that individual's contribution [such as the work done by an experienced engineer] does not directly relate to product marketing or investment decisions of the company [which led to the failure]. However, as observed by Rider and Negro (2015), the longer tenure within a failed organisation may become an indication that the individual may have been exposed to unsuccessful organisational practices, which can include technology practices. In the case of the lawyers who were involved in this study, people who were strongly associated with the failed organisation had to face the *'failure-related discredit'* (Rider and Negro,2015). This study of Rider and Negro (2015) has also found that when individuals have some background with educational prestige that can reflect the individual's ability to succeed in the future role, it has been able to buffer the risk of *'intra-professional status loss'* due to organisation failure. Therefore, Rider and Negro (2015) claim that both individual's prior experience and educational affiliations have an influence on post-failure labour market outcomes. This observation may be relevant to those who have an accumulation of legacy skills through experience or historical academic activity. If the individual's experience is filled with outdated technical skills, when the industry is disrupted with modern technology, it may be prudent to change knowledge [growth by learning] by creating new affiliations with prestigious organisations offering knowledge about modern technologies. During the problematizing cycle, one of the participants explained that he had to take a single-semester certification course on artificial intelligence management from a prestigious university. Using the observations of Rider and Negro (2015), the value of such an effort may be justified. Since the hiring organisations evaluate job candidates *'by reconciling aggregate beliefs about both negative and positive characteristics'* (Berger and Webster, 1988; Gorman, 2006; Ridgeway et al., 2009), those who have a longer tenure with legacy skills can reduce the risk by developing a renewed learning attitude, perhaps with the help of prestigious institutions.

5.2.10 Development of self-initiated proactive behaviour

In change situations, proactive behaviour is a positive attitude in which individuals who have confidence engage. Solberg and Wong (2016) differentiate proactivity from adaptivity. They

define proactivity as *'self-initiated efforts to bring about change at work'* whereas adaptivity *'refers to the effectiveness with which employees deal with externally-initiated work changes'* (Ibid, p.715). Although adaptivity and proactivity differ from each other both theoretically and empirically, adaptivity is a necessary contributor for proactive and job-crafting behaviours (Strauss et al., 2015). This evidence which is based on resource-based theories of coping, claims that, in situations that demand change, adaptivity provides necessary resources required for proactive behaviour. Particularly, adaptivity could increase the self-efficacy of the individual, which is necessary for change. This self-efficacy can *'facilitate optimism and contribute to the maintenance of a strong resource repertoire that is needed to deal effectively with work demands'* (Solberg and Wong, 2016).

Demonstrating proactive behaviour at work involves a certain amount of risk. As a result, the employees are required to have some level of confidence that they can initiate the change and absorb the consequences (Solberg and Wong, 2016). When it is necessary to pursue risky proactive endeavours, proactive employees can *'prepare themselves to make changes by exchanging informational resources with others which, in turn, builds the trust that is needed'* (Gong et al., 2012). Hence, taking initiatives for network-building becomes an essential mediator for the job performance of proactive employees (Thompson, 2005). Proactivity does not alone happen through an individual's effort but also depends on the surrounding social contexts, which feeds inputs and receives output from the proactive behaviour. Such input and output with the social context can shape how it would be achieved and who will be involved. Also, proactive employees who cultivate higher job satisfaction are known to have good exchange relationships with their supervisors (Vough, Bindl and Parker, 2017).

5.3 How contributions from the literature influence development of an actionable model

The outcome of the data analysis revealed that there are three vicious cycles into which IT professionals can get entangled. Some individuals may find themselves already entangled in one or more of these vicious cycles, while others may be in a vulnerable state. Therefore, it may be necessary for the actionable model to understand whether the IT professional is already in a vicious cycle or at risk of falling into a vicious cycle. If there is a risk, it will help the user to generate actions aiming at mitigating that risk. If one is already in the vicious cycles, then the result in actions might be targeted towards helping the professionals to come out of the vicious cycles. It

has been found that amongst different types of changes, changes to attitude may be necessary. This literature review helped to use the current body of knowledge about changing the attitude and behaviour to generate insights on the attitudes, behaviour and affective components of attitude, leading to identify vulnerabilities and a cause of actions. These insights can be combined with the insights from the problematizing cycle and the data analysis effort towards generating the actionable model and the actions. In this section, how the literature would contribute to this process will be discussed.

Based on the findings, it appears that there is a need to have an assessment stage in the process of generating actions by the individuals; in this case, the IT professionals [IT consultants]. This collaborative action research is participatory, and each participant is considered as a peer. Therefore, the actionable model promotes self-initiated enactment. Hence the evaluation process could be done as a self-assessment. The literature provides many contributions to understand what some of the key components of the self-assessment could be. There are several characteristics that can negatively contribute to the emerging scenario. The first thing is to consider whether the individual is demonstrating the presence of rigidities associated with being a part of the status quo with long-held beliefs leading to inertia. It is important to know what the current perspective about the emerging changes is related to the rapid adoption of AI and automation on the individual's job. Has the individual started showing any symptoms of *'cynicism towards change'* (DeCelles et al., 2013)? Do contextual factors such as the person's organisational climate provide any necessary support to reduce CTC? While the attempt to answer such questions, it is essential to determine if the current leaders of the employee are fostering change supportive climate, whether they allow job-crafting, proactivity, etc.

The literature also revealed the importance of change readiness attitude. If the individual is not change-ready [in this case to handle the disruption due to rapid adoption of AI and automation], it will be necessary to assess whether there are any symptoms of lack of change readiness. A person who is change ready would demonstrate tolerance for lack of control of the change situation. Also, the person would see that the change is controllable. It is necessary to assess if the individual demonstrates these change-related behaviours. For example, *'procrastination, disengagement, or avoidance'* by the individual could signal a lack of control (Vardaman et al., 2012).

On a positive note, if the person has a chance of retaining the job and performing during the disruption, then it is worth understanding the level of job embeddedness and in what ways the job embeddedness contribute to the performance. If the embeddedness is derived through not mere 'sacrifices', but if it is also supported by 'links', and 'fit', it may be an indication that the individual has the necessary ingredients to use job embeddedness towards performance (Kiazad, Kraimer and Seibert, 2019). Hence, the design of the guidelines for self-assessment could consider these job embeddedness related insights.

Since the understanding that change-beliefs are the *'most-proximal antecedents of change-readiness attitude'* (Rafferty and Minbashian, 2019), the encouragement towards developing change-readiness through actions can be started by evaluating the change beliefs. In this review of scholarly literature, five such change-beliefs have been identified. The self-assessment questions that will be evaluating the exposure to the three vicious cycles are likely to address the ***'discrepancy'*** belief. When individuals generate actions by taking actionable model as a reference, they will do so in a cyclic manner while validating in each cycle. This validation process would address the ***'appropriateness'*** belief. While the majority of actions taken by individuals might be addressing ***'change self-efficacy'*** belief; from a self-assessment perspective, it is necessary to benchmark if the individual currently uses information cues (Vardaman et al., 2012) and demonstrates having '*personal resilience'* (Sonenshein and Dholakia, 2012). The ***'principal support'*** change-belief must be evaluated during the self-assessment because the experienced IT professionals, particularly the IT consultants, are required to work with minimal support [it is a norm of the practice]. However, Princeton Pragmatics can explore how it can facilitate individuals the ability to provide peer-support using informal networks by establishing such channels [a possible managerial action]. The job embeddedness of experienced IT professionals can lead to rigidities and vulnerabilities, particularly if it is based on mere sacrifices. Individuals recognise sacrifices because they evaluate what value can they take out of their job. Whether someone would show inertia towards taking the initiative to work, changing the skills, changing the job or even changing the attitude to survive from the emerging technology disruption would depend on how they evaluate relative value differences. Hence, it is vital to evaluate the individual's ***'valance'*** belief related to the change that may be necessary.

One of the three vicious cycles is the "**vicious cycle due to resource limitations"**. In this cycle, the availability of time has been identified as a critical resource. It may also include resources such as the availability of training and knowledge. The literature revealed that *'job crafting'* (Niessen et al., 2016) may be a viable option to create breathing room while attempting to establish necessary fit to the job demands, particularly during *'role-overloading'* (Solberg and Wong, 2016). Therefore, the self-assessment can evaluate if leader support and autonomy is available; as a result, actions leading to job-crafting can be attempted.

One of the key contributors to each of the vicious cycles is the skills that are becoming obsolete. Frequently, the word *'baggage'* was used to highlight this legacy knowledge that individuals accumulate in their IT careers. Lawrence (2018) showed that when obsolete practices are present, there needs to be some amount of unlearning. Therefore, it is necessary to evaluate if any of the legacy skills of the individual can become a candidate for unlearning. A classic example for a software engineer would be to unlearn rigid practices of traditional waterfall-based software development practices and learn more agile software development practices. In this example, unlearning means a change to the fundamental thought process as for humans, there is no 'delete' button that can erase content from memory.

Finally, if any individual is likely to have been entangled in the ***'vicious cycle due to entrapment'***, there is a chance that the organisation with legacy practices can demonstrate failure. This literature review discussed 'intra-professional-status-loss' due to organisation failure. However, it will be hard to predict organisational failure. Nevertheless, it would be possible to evaluate if the individual has the risks of 'intra-professional-status-loss'**,** in the case, the organisation which provides employment fails. Hence, self-assessment can assess that risk; as a result, if necessary, actions can be taken to mitigate that risk.

So far, only the relevance of literature for creating a baseline assessment before the change has been discussed. Once the discrepancy has been identified, with each impacted angle [which was used in the assessment], actions for improvement can be taken. For example, designing the enactment stages of the actionable model [which would directly address eliminating the risks of three vicious cycles] can consider, development of a commitment to change. Out of the three types of commitments found in the literature, the *'affective commitment'* can be given more prominence due to its ability to *'buffer'* the individual from adversity' (Sonenshein and Dholakia, 2012). The

actionable model could consider promoting the use of informal networks by the individuals to improve ‘principle support’ change belief as well as lifting affective and resource-related advantages of having ‘links’ and network centrality (Vardaman et al., 2012).

The goal of all types of changes that may be necessary would lead to the building of change self-efficacy. For example, any effort which encourages the development of skills would improve self-efficacy by giving more marketability to the IT consultant. The rapid adoption of AI and automation is unlikely to become a trend over which individuals can gain ‘power over’. Then the best option would be to encourage to develop the power to adapt by the individuals. Hence the development of self-efficacy coupled with learning and growth can be targeted in actions promoting change self-efficacy belief. Also, by enacting on building contextual support, ways of igniting proactive change behaviour (Solberg and Wong, 2016) could be explored.

If the self-assessment reveals the opportunity to use job-crafting to increase ‘fit’, the actionable model could consider what type of actions would increase the ability to do task crating and relational crafting. Among the experienced IT consultants, there is a percentage of individuals who do not have that many years before their retirement. Some actions can be in place to help such individuals to develop cognitive crafting, although the former two types of job crafting can be recommended for those experienced individuals who have a reasonable time left in their career. Finally, the actionable model could attempt to prescribe reference guidelines to address the risk of ‘intra-professional-status-loss’ by means of increasing recent affiliations with prestigious academic institutions in a manner that does not provide a heavy financial burden on the IT professional who needs that level of help.

Based on what has been reflected in this sub-section 5.3, an actionable model, which is a form of a generalised enactment process paradigm [an engine of action], can be designed by synthesising the insights from the literature review and the findings of this research derived from the data analysis. Chapter six is fully dedicated to describing the details of this actionable model. It will show that the theoretical backing from this literature review gives a strong foundation to the design of every part of the model.

Chapter Six – An actionable model

6.1 Introduction

The primary design goal of the data analysis cycle was to come up with a critical deliverable that can drive actions taken by the individuals who have been affected by the problem being investigated during this research. This deliverable is an actionable model from which the affected individuals can make informed decisions to take the next steps during their navigation or adaptation during the emerging trend of the rapid adoption of artificial intelligence and automation. Now, this model is meant to be used by IT consultants and technologists who seek work with Princeton Pragmatics to find work projects of IT job placements. This closing chapter of the data analysis cycle will unveil the details of this qualitative model.

6.2 Design of the Actionable Model

This actionable model is a reference model for generating actions based on the observations of the model users in their specific scenarios. As a reference model, it would provide guidelines for implementing a repeatable and re-adjustable process through which the individuals can pick and choose the features available to support their decision-making needs during each stage of the enactment process. Hence, this model logically separates guidelines relevant to different stages of the "enactment" process. The data analysis research cycle revealed two critical issues. The first one is that it would be necessary to have a mechanism for the users of the model to recognise the issues they have. Once a proper assessment has been done, depending on the user's specific situation, possible guidance could be given. To address the main issue of lack of awareness about the issues arising from the emerging trend, the actionable model will propose some form of a process that would ensure that the model's user will be able to discover emerging trends that are relevant to that person. Since the data analysis reveals specific characteristics of the three vicious cycles, the insight from the data analysis related to the three vicious cycles will help individuals evaluate their vulnerabilities. Some gaps related to the understanding of how to change the attitudes of experienced consultants to become ready for the change were filled by the knowledge gathered from the literature. This body of knowledge from the peer-reviewed literature has ample information on detecting change supportive behaviours such as change readiness and the resistance towards change such as cynicism towards change. Also, the

literature contributed to the improved understanding of the roles played by the change beliefs towards change supportive behaviour. It was possible to produce requirements criteria for doing a self-assessment by the individual by combining these insights from the literature and data analysis. The model also required the necessary knowledge to recommend efficient ways to derive possible actions by its users. The analysis of the data from interviews revealed that several related themes clustered around nine different areas of improvement, namely “find what is next after AI and automation”, “understanding where the demand is”, “increasing awareness of emerging technologies”, “building partnerships, support and collaborative webs”, “creating new markets”, “negotiation”, “Strategies, time management and learning tactics”, “learning in action” and “changing roles”. The clusters of themes contributing to each of the above nine categories have quotes that contained a wealth of information on how to focus on improving in these areas. It was evident from the data analysis and the well-formed knowledge from the literature that to achieve development in these areas; one needs to change attitudes. The information gathered from the quotes from data analysis and the knowledge from literature could be organised into a small database called an action catalogue. Depending on the particular vicious cycle, the access to the information in the action catalogue could be streamlined efficiently. This indexing mechanism was possible in the form of heuristic maps because the thematic relationships revealed what types of interventions could be more effective in specific scenarios. Therefore, the structure of the heuristic maps was influenced by the relationships between the co-occurring themes and the related quotes. As a result, the user can determine which type of improvements will be more optimal to be used during a specific vicious cycle scenario. Therefore, the actionable model’s design can be considered as a synthesis of the knowledge from the data analysis and the knowledge from the post-analysis literature review.

6.2.1 Overall structure of the Actionable Model

The level-1 design or the holistic view of the actionable model, is depicted in Figure 11.0. The goal of the actionable model is to generate possible corrective actions based on whether there is a vulnerability in falling into a vicious cycle. Determining the types of actions that may be necessary is not a straightforward process.

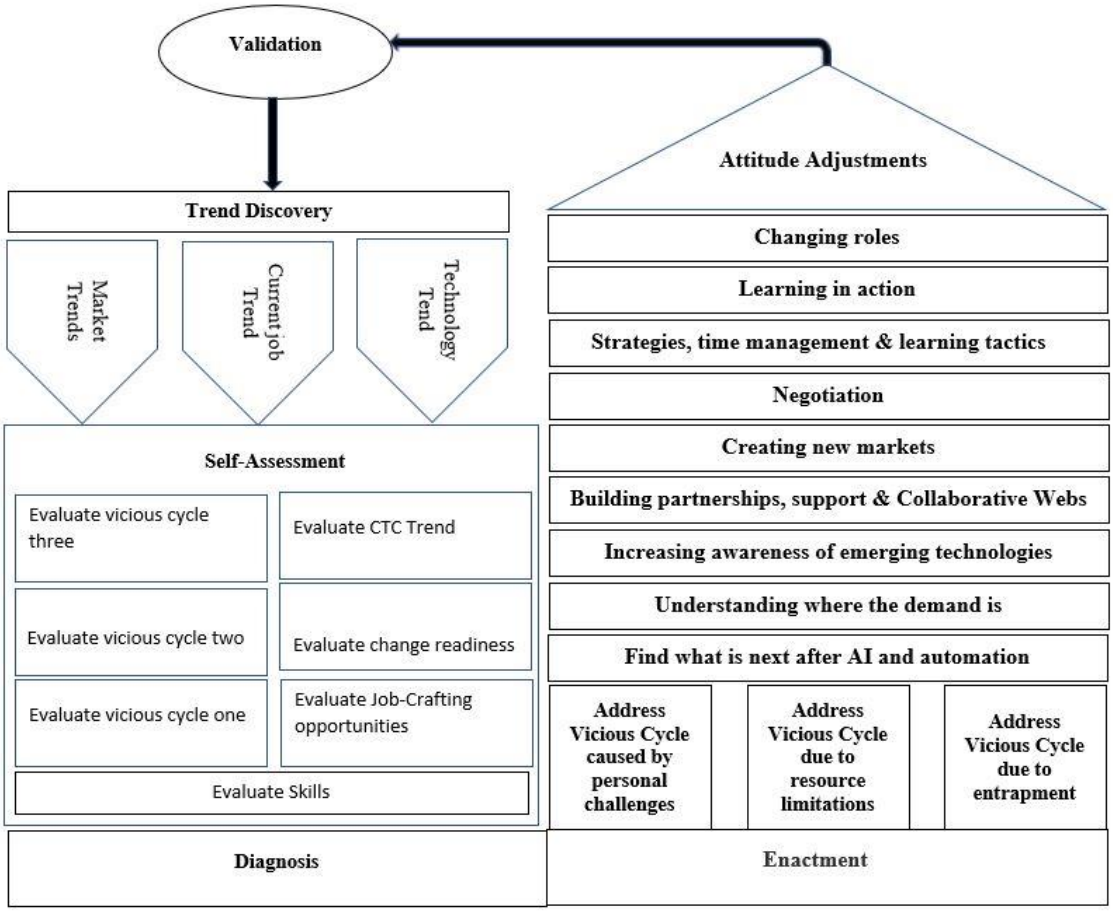

Figure 11.0 holistic view of the actionable model

The first phase is called "**Diagnosis**", and the second phase is called "**Enactment**". Diagnosis has two main stages. The first stage is called the Trend discovery, which is an ever-continuing activity that would help to determine if any disruptive trends are emerging in the market [Market Trends], current workplace [Current Job Trends] and the technology field [Technology Trends]. The second stage of the diagnosis stage is a self-assessment activity. Self-assessment is a scheduled activity, which can be scheduled to occur about every six months [as technology trends move rapidly]. In extremely special cases where continuous trend discovery triggers alerts of substantial importance, it may be necessary to conduct an ad-hoc self-assessment.

The enactment stage is built upon three foundational pillars involving action generation related to addressing **personal challenges [Figure 4.0], resource limitations [Figure 5.0], and entrapment [Figure 6.0].** Informed by the insight from the data analysis and the literature, the

model outlines ten different action categories that can be used to generate actions in each of these scenarios. These actions, categories will be further mapped into an intuitive action selection mechanism. The design of this actionable model gave a lot of thought to the limited time available to the IT consultants and technologists who want to benefit from it. Most activities do not have to be done daily. Initially, it might take about sixteen hours of one-time effort to set up the process. After that, if they can make trend discovery for about ten minutes every day would be sufficient. Suppose the actions require self-development activity such as self-learning. In that case, it may be necessary to find about 1 hr every day for a duration of about three to four weeks per learning activity.

6.2.2 Diagnosis Stage

In this subsection, I will outline the detailed guidelines which can be used by the adopter to come up with the structure to the diagnosis stage of the adaptation process. The guidelines described here are abstract enough for someone to be able to separate the methodological approach from subjective nuances. One could carefully review the guidelines and decide what specific guidelines are of value. The idea is not to thrust too much of the resource burden on a professional who is already finding it difficult to find time to deal with issues.

6.2.2.1 Establishing a trend discovery mechanism by the IT consultants

As the first stage of the diagnosis mechanism, it would be quite essential for the IT consultant to be aware about the operating environment [external environment] of the consultant. The trend discovery therefore involves how the trends in this external environment would influence the IT consultant. This trend discovery mechanism's implementation for a given person will be very subjective and unique to that person and the timeframe. That is because what is in the focus of interest changes with time. Therefore, the search of information would change its focus to different directions depending on time. Therefore, the following guideline could be customised by each individual [especially the information sources for input and the output] and could be continuously updated over time.

When the trend discovery mechanism polls for information from various sources, it needs to pull only the relevant information and filter out unnecessary information from various sources. This

information filtering criterion could be defined by the inputs. These inputs will be very subjective to the individual and the timeframe during which the trend discovery cycle will be taking place.

When understanding the job market trends, it would be necessary to query those based on the current or future job title, existing skills [it would be helpful to use existing skills as keywords to search when evaluating existing demand], industrial sector [demand can vary across industries], current or alternative geographical locations, and the desired compensation. When retrieving available job vacancies, the list of required skills and the frequencies of occurrences of the specific skills in different jobs available in the market could be extracted. Comparison of these frequencies for different skills would provide an indication about which skills are going out of demand and which new skills will be required by similar jobs matching the criterion.

Another essential feature of a good trend discovery mechanism would be to be sensitive to the changes happening in the external environment producing new technology trends. Since the available time for a professional is very limited, the implementor could consider that it is impossible to subscribe to every channel of information. One could choose a good internet search engine [most people consider google.com as a leader of search engines] to search the information about trends. Depending on the type of job duties which the person is interested in, one could look for different sources that have become popular among others who are doing the same type of work. Such information can be found from informal networks and other relationships. Also, search engines can reveal such information sources. If such forums offer free delivery of newsletters, subscription to those can guarantee any topics of interest will be delivered to the IT consultant directly. Other times, it would be best to spend a few minutes go and look for such information at a regular frequency. The information that is frequently available from such forums usually represents the trends that have already begun or manifested into fads or fashions. The most difficult thing to understand is what has not yet occurred. Only those visionaries and thought leaders who know about how the world could be changed within the next few years will have some clue about such trends. It is possible to choose multiple thought leaders from the industry and follow them in social media and new media which publish their ideas.

The third duty of a trend discovery mechanism could be to ensure that the individual does not become outdated within his or her current work environment. To do this, the individual must

understand where to obtain the most current information about the company's strategic roadmap, preferably the IT roadmap. The automation and AI adoption strategies are articulated in the IT roadmap. Suppose the current company does not have a published IT roadmap; in that case, there has to be something equivalent within the organisation which determines the target state of the IT systems in the upcoming years and allocating a budget to achieve that. Increasing awareness about this process so that what is likely to change in technology, what jobs will be in demand and who has the power over changes can be learnt. Also, any employee or an IT consultant has access to the jobs opening up within the organisation on a routine basis. It is critical to evaluate what technologies are being acquired by the organisation and what type of skills the current organisation is ready to give up. The technology inventory of the organisation is likely to mark some of the technologies as sunsetting, which means that those technologies will have a short life. Such information can be collected during the trend discovery.

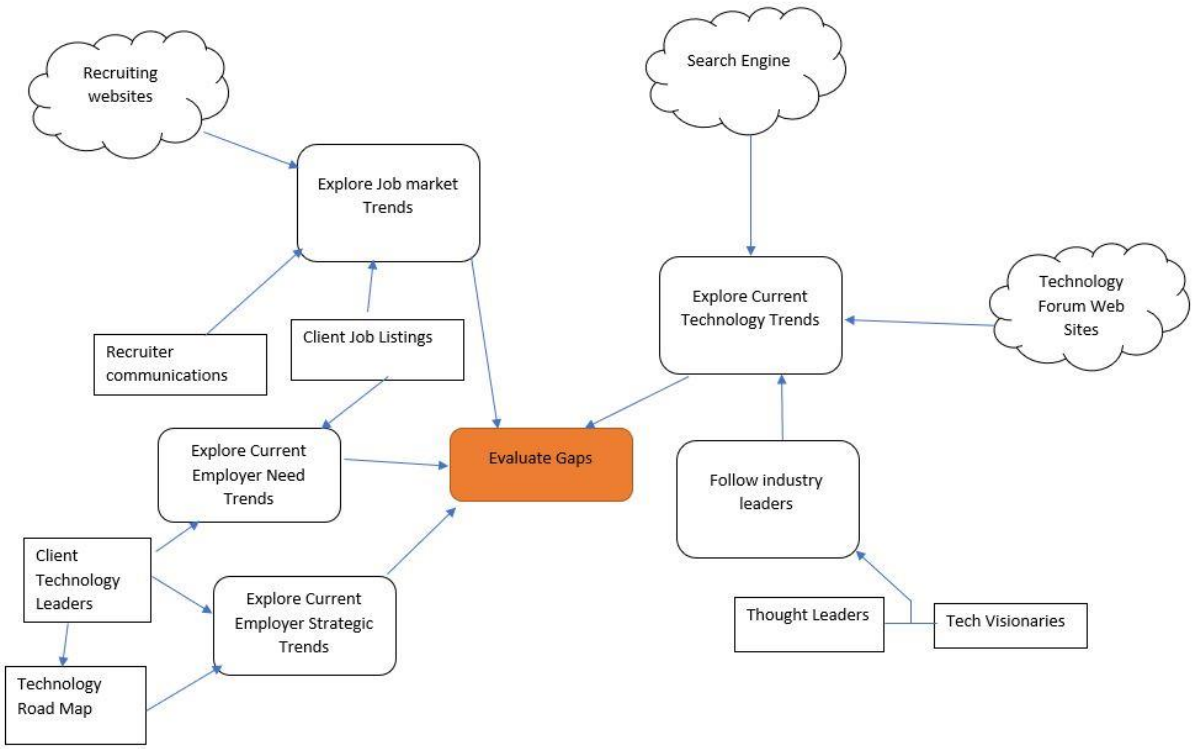

Figure 12.0 the essential components of a simple trend discovery mechanism for IT consultants.

The above illustration in Figure 12.0 describes one configuration of a simple trend discovery mechanism. This configuration is not the only way it can be arranged, and the purpose of the illustration is to demonstrate the key activities desired here. The activities related to exploring the job market trends require an hour or two to be spent to analyse.

The initial effort to set up an effective trend discovery process might require about a day's effort. After that, if the user can have a daily routine to spend ten minutes [the interview participant Kevin says he reads while spending time in the toilet] to check different sources for information. Only when one finds some useful trend related information, one might need to spend an hour or two doing impact analysis. This level of effort is essential because the IT consultant's immediate environment may not readily have the most critical information which the IT consultant must know.

6.2.2.2 Establishing a self-evaluation mechanism by the IT consultants

Everyone needs a custom self-assessment questionnaire. However, there is potential re-use of the questionnaire among IT consultants who are doing a similar job [this can be verified during the validation research cycle]. This guideline provides the skeletal structure for a self-assessment. Combining the insights from all three sources of analysis, I have come up with the high-level structure of the self-assessment as illustrated in the following tables [tables 5-A to 5-H].

Assessment category	Assessment sub-category	Guideline for question generation
Evaluating Skills	Outdated Skills	The questions could target evaluating the top three skills of the individuals to see if those skills have been updated recently or they represent legacy skills.
	Demand Within Current Organization	The questions could evaluate whether the person's top skills are still being used within the current organisation.
	External Demand	These questions could motivate the individual to use the trend discovery mechanism and explore if the external environment in the industry is willing to hire the person based on the available skills.

Table 5-A Self-Assessment guidelines to evaluate skills.

Assessment category	Assessment sub-category	Guideline for question generation
Evaluating the vicious cycle due to personal challenges	Personal life Challenges	The self-assessment could contain some highly confidential questions evaluating the home-related obligations in terms of time, effort and financial burdens, etc.
	Work-related Challenges	The questions under this section could evaluate the lay-off risk, the manager's attitude towards the individual, and whether the work demands more time and effort than the one could normally put in a similar job.
	Learning Difficulties	The questions under this section could discover if the individual has any home or work-related factors which makes it difficult to learn.

Table 5-B Self-Assessment guidelines to evaluate the vicious cycle due to personal challenges.

Assessment category	Assessment sub-category	Guideline for question generation
Evaluating the vicious cycle due to resource limitations	New Demands for Specialisation	The goal of these questions is to determine if the current specialisation the individual has in performing current duties is sufficient?
	Unavailability of monetary funds for learning	Questions appearing under this section could evaluate if the individual can get financial support from the current organisation to develop skills or whether the short-term or longer-term personal financial investment can be made to acquire new skills.
	Unavailability of time as a resource for learning	This section could contain questions that can indirectly determine how the individual spends the available time for various activities and then determine how the person could allocate ample time for skill development.

Table 5-C Self-Assessment guidelines to evaluate the vicious cycle due to resource limitations.

Assessment category	Assessment sub-category	Guideline for question generation
Evaluating the vicious cycle due to entrapment	Sacrifice driven job embeddedness	The questions under this section could explore if the individual is having job embeddedness driven solely by sacrifices as described in the article of Kiazad et al. (2019).
	Overexposure to legacy technologies	There has to be a set of questions in the assessment which can indirectly ask questions about the maturity of experience and the nature of the skills being used and determine if the top skills of the individual can be considered legacy, which requires an upgrade.
	The threat of substitutes	The questions related to this sub-category could evaluate if there is a growing trend within the current organisation to drastically adopt new technologies such as automation and AI while reducing the demand for the individual's key skills.
	The trend of attrition	The questions related to this sub-category could evaluate if the company has started reducing the staff related to the individual's work area or have the other employees in the same area started leaving the organisation.

Table 5-D Self-Assessment guidelines to evaluate the vicious cycle due to entrapment.

Assessment category	Assessment sub-category	Guideline for question generation
Evaluating the CTC Trend	Evaluating Status-Quo	The involvement of a status-quo by the individual can make it difficult to appreciate changing situations. Hence some questions could be included to evaluate if there is such involvement.
	Individuals CTC attitude	DeCelles et al. (2013) described how cynicism towards change could occur at multiple levels. Some questions need to be in place to discover if the individual shows CTC behaviour as it can show attitudes that can oppose the change readiness.
	CTC Climate	When discussing multi-level cynicism towards change, DeCelles et al. (2013) described the role of the CTC climate.

Table 5-E Self-Assessment guidelines to evaluate the CTC Trend.

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Assessment category	Assessment sub-category	Guideline for question generation
Evaluating Change Readiness (controllability)	Achieved Control	Vardaman et al. (2012) showed that a sense of controllability of the change is important for the self-efficacy belief. Some questions could be available to benchmark how much controllability the individual has achieved based on personal belief.
	Evaluate if the change is viewed as Controllable	Some questions could evaluate whether the individual has that potential or whether the individual believes that leadership and management can control the situation.

Table 5-F Self-Assessment guidelines to evaluate change readiness (controllability).

Assessment category	Assessment sub-category	Guideline for question generation
Evaluating Change Readiness (beliefs)	Discrepancy change belief	Rafferty and Minbashian (2019) described the role of discrepancy belief in developing change readiness. It is essential that some questions evaluate if the individual believes that there is a discrepancy that justifies the need to change in the emerging scenario.
	Appropriateness change belief	Rafferty and Minbashian (2019) explained that a change-ready individual would believe that the suggested changes are appropriate. Some questions could determine the appropriateness of all the available options to the person to address the discrepancy.
	Change self-efficacy belief	Some questions could use the insights given by Rafferty and Minbashian (2019) in this regard to evaluating what sort of improvements can be suggested to boost the change self-efficacy belief.
	Principal support belief	The description available in Rafferty and Minbashian (2019) on how various forms of principal support can be obtained and the belief of its availability affects change readiness prompts to have several questions evaluating the existing beliefs within the individual.
	Valance belief	Rafferty and Minbashian (2019) state that one of the change beliefs is valance, which would make the individual evaluate the value that can be derived from the change. Hence, some questions are needed to consider the value from the change to the individual and the value of the individual to the organisation during the change.

Table 5-G Self-Assessment guidelines to evaluate change readiness (beliefs).

Assessment category	Assessment sub-category	Guideline for question generation
Evaluating Job-Crafting opportunity	Leader Support	Solberg and Wong (2016) suggest that there needs to be the leader's support tolerance for Job-Crating to be possible; hence some questions could evaluate this leader support.
	Need for Task Crafting	The questions for this section could determine if there is a lack of fit to the current role during the change or the individual has some extra skills that can be made valuable during the change.
	Need for Relational Crafting	In some cases, difficulties can be eliminated by changing the available relationships required to accomplish the change.
	Need for Cognitive Crafting	Some questions are required to determine if psychological comfort adjustments would be sufficient [for people nearing retirement].

Table 5-H Self-Assessment guidelines to evaluate change readiness (beliefs).

6.2.3 Enactment Stage

As the model overview (Figure 11.0) suggests, the actionable model provides ten possible action categories identified by the data analysis and a comprehensive literature review. Practically, actions from any category of actions could be possible during any type of vicious cycle exposure. However, specific actions may not be feasible in a specific situation. For example, while getting enrolled in a prestigious university to obtain a graduate certificate in AI would be appropriate for someone who risks intra-professional status loss during entrapment, it may not be a feasible action for someone who has financial resource restrictions. It has been recognised that some actions will be more optimal during certain vicious cycle scenarios. This enactment stage introduces three heuristic devices to tackle the three vicious cycles. Each of the heuristic devices, which will be described in the next three subsections, will consist of a heuristic mapping of action categories to problem domains in each vicious cycle. Each heuristic map will be supplemented with an action template catalogue which will be presented in the tabular form. It must be understood that the details provided in the heuristic devices are not fixed. The heuristic mapping can be changed based on renewed understanding after each cycle validation, and every validation phase could involve discussing if these mappings are still valid.

6.2.3.1 Enacting to address personal challenges

This subsection outlines the heuristic device to derive actions for the vicious cycle due to personal challenges. To make use of this tool, one has to first understand the most prominent problem domain based on a self-assessment. By using the heuristic map in Figure 13.0, one could determine which action categories can be prioritised. Then, the recommended action templates can be chosen from the action catalogue. The action catalogue is structured in a tabular form in which the problem domain is represented by the first column. When the below heuristic map in Figure 13.0 shows an arrow linking to an action category, it introduces another mapping column. Finding the content of the cell intersecting a problem domain, and an action category would reveal possible action templates which can be tried when the problem domain under concern maps against the selected action category becomes relevant.

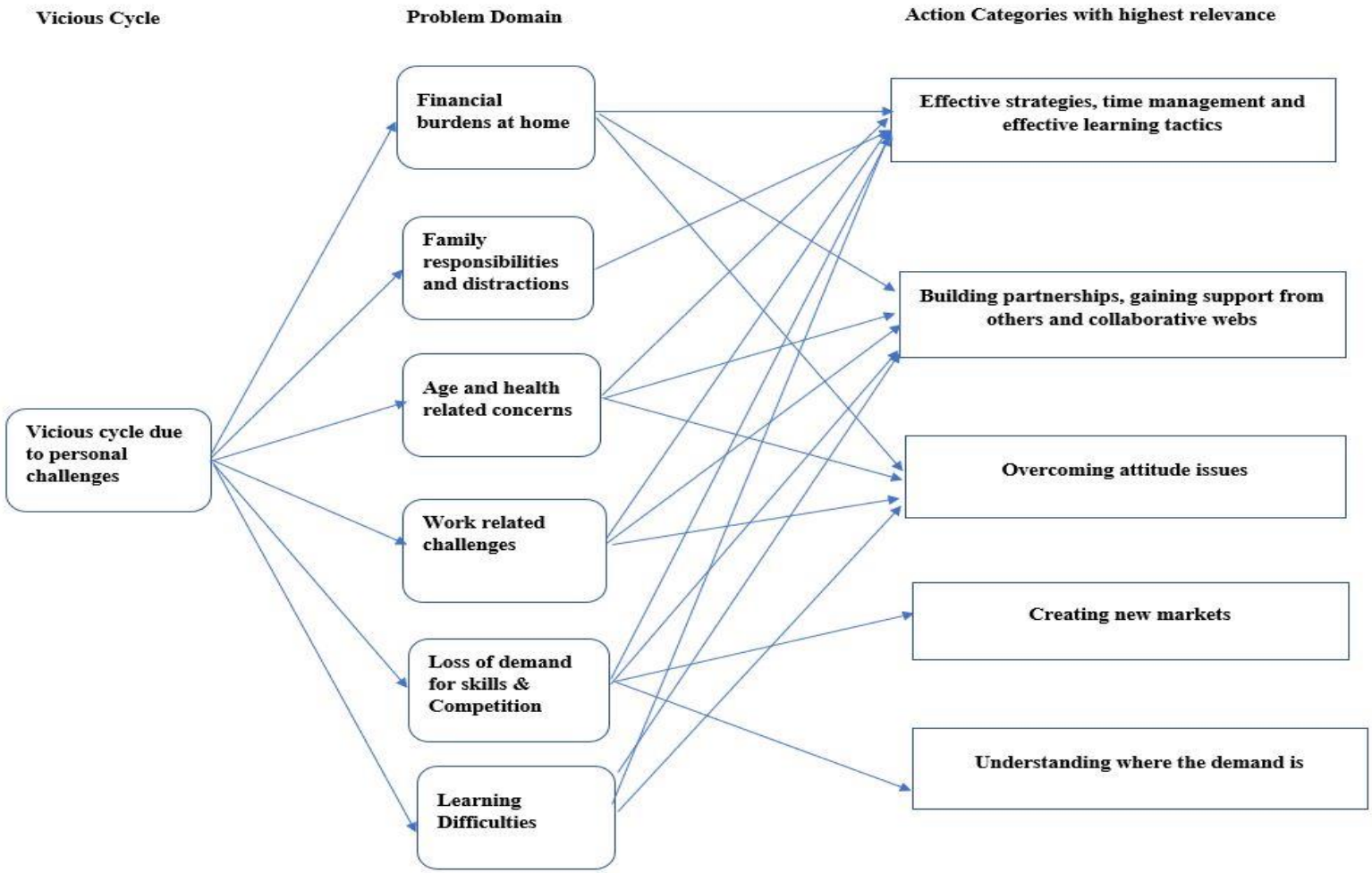

Figure 13.0 Heuristic map for action generation for vicious cycle due to personal challenges.

6.2.3.2 Enacting to address resource limitation challenges

The current subsection is dedicated to outlining the heuristic device to guide the enactment for the vicious cycle due to resource limitations. To adopt this device, one could follow the heuristic mapping illustrated in Figure 14.0 to prioritise the optimal action categories. Once the optimal categories have been picked from the heuristic map, the user can refer to the actions- catalogue to determine what would be the most relevant action templates to be used in the case when those categories become relevant for the given vicious cycle and problem domains.

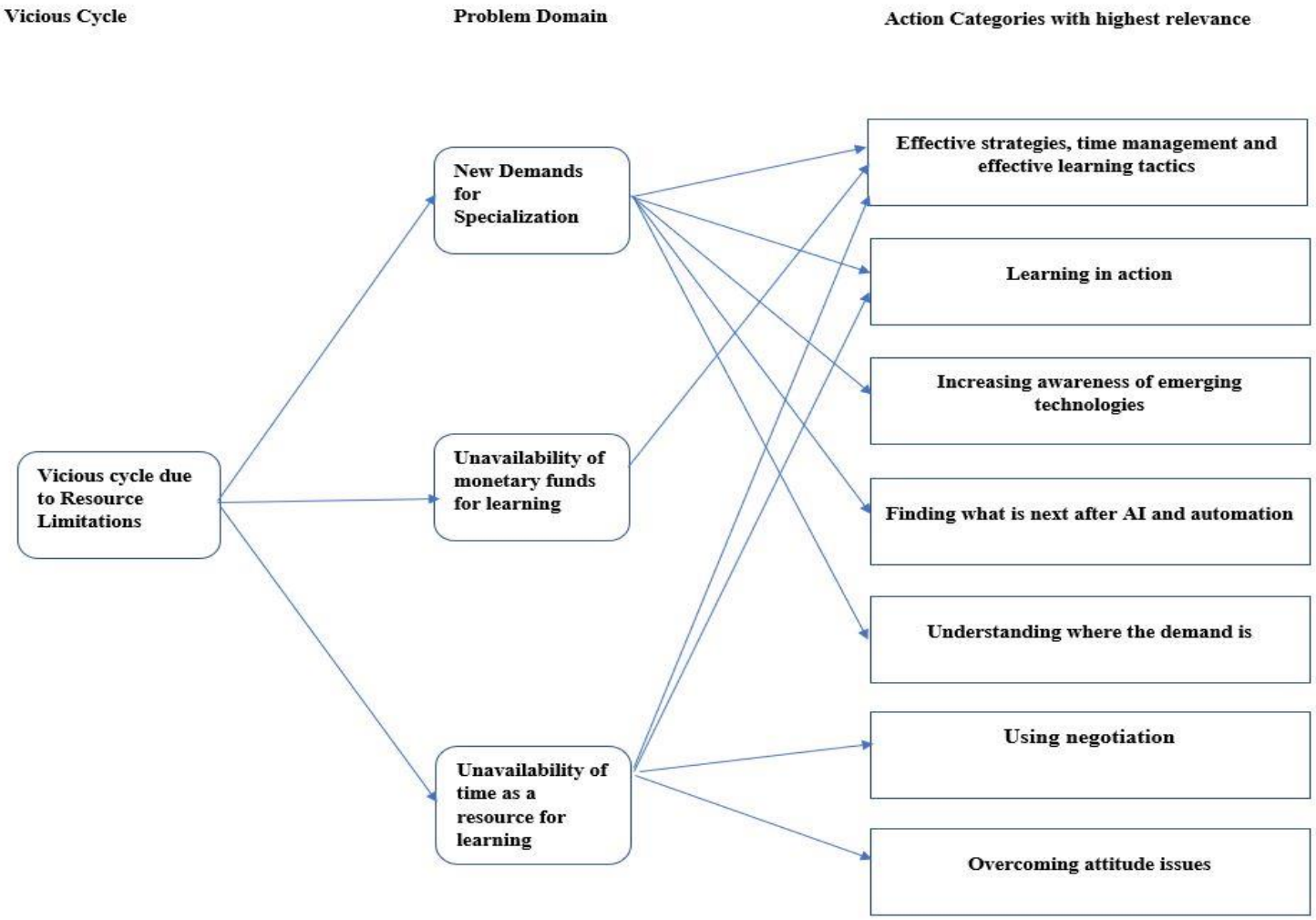

Figure 14.0 Heuristic map for action generation for vicious cycle due to resource limitations.

6.2.3.3 Enacting to address entrapment driven challenges

Finally, in this subsection, the heuristic device to address the vicious cycle due to entrapment can be outlined. In Figure 15.0, the heuristic map shows how to find the appropriate action categories during this scenario based on the prominent problem domain. Similar to the previous two heuristic devices, in this case also, the user can use the catalogue to determine the action templates that are most optimal to be implemented for the particular situation by applying the problem domain and category information as indexes to trace the content.

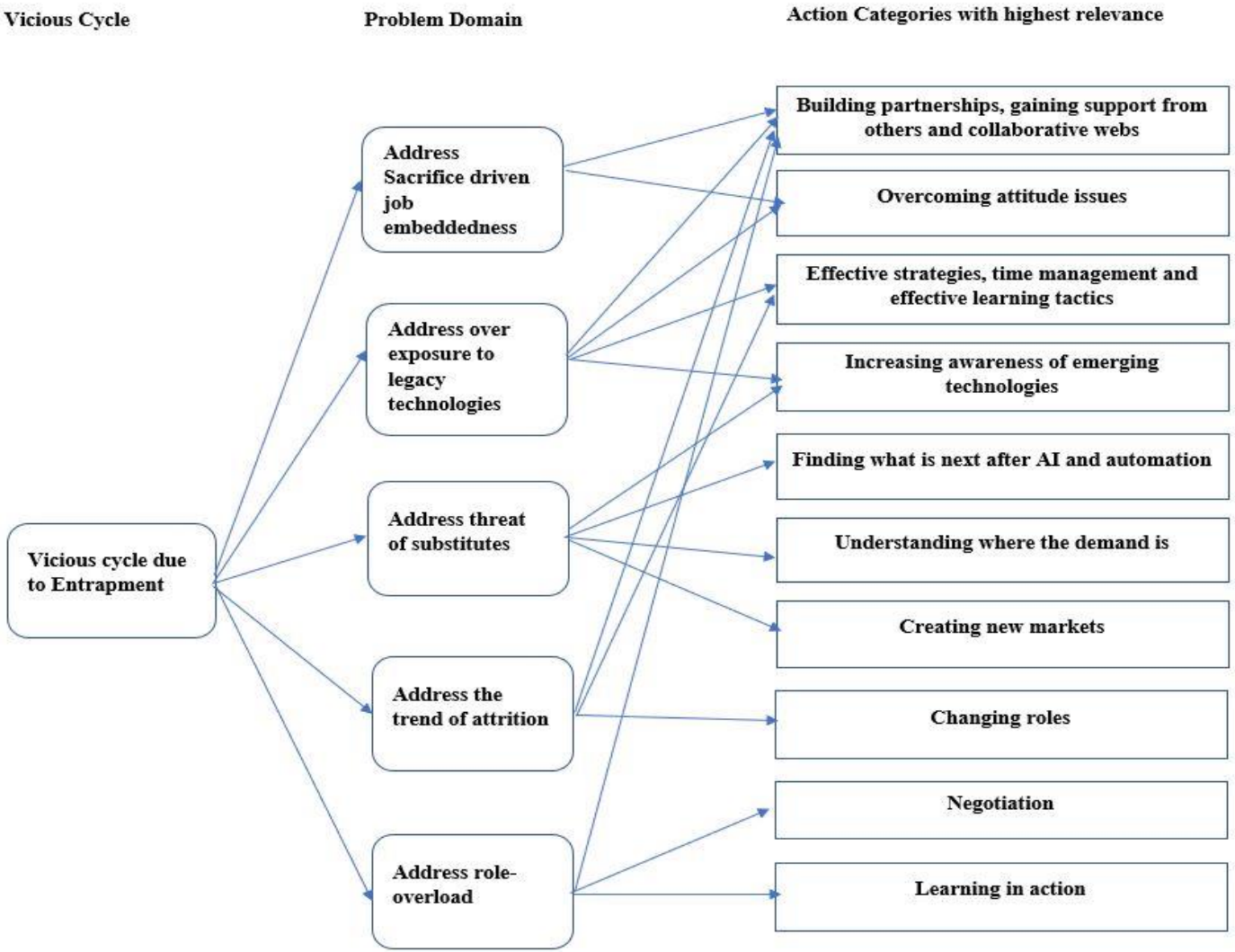

Figure 15.0 Heuristic map for action generation for vicious cycle due to Entrapment.

6.3 Defining managerial actions for Princeton Pragmatics

This research proposed the selection of the "IT consultant" as the unit of analysis of the problem. Hence the actions that are proposed by the actionable model falls within the scope of addressing the issues to the IT consultants and the IT professionals. However, the outcome of the actionable model has several implications for Princeton Pragmatics as an organisation. The content in table 6 summarises these managerial actions and their implementation schedules. These implications will be further elaborated in section 8.3 in chapter eight.

Action Category	Managerial Action	Schedule
Model Validation	**Initial validation within the collaborative action research group**: Before introducing the actionable model to a broader audience, conduct the initial model validation.	Thesis Research Cycle 4
Model Governance	**Initial Model adjustments and communication:** Based on the feedback within the collaborative action research group from validation, make adjustments to the model and communicate to the subscribers.	Thesis Research Cycle 4
Model Adoption	**Introduce the model to a broader group:** The details of the actionable model will not be shared with an extended audience until this thesis is reviewed and accepted. Once the examination process completes, it will be necessary to identify another batch of IT consultants and IT professionals and socialise the actionable model with them.	Post Thesis
Strategic Renewal	**Review the service offerings of the company and make amendments to the marketing plan after every six months validation cycle.**	Post Thesis – Every six months
Model Governance/ Model Validation	**Repeated validation and adjustment cycle every six months.**	Post Thesis – Every six months

Table 6 Immediate managerial actions available for Princeton Pragmatics.

6.4 Implications for the planning of actionable model validation cycle

Based on work done so far, the actionable model proposes a self-correcting reference model for generating actions. It provides insights for individual IT consultants to generate possible actions and a mechanism for Princeton Pragmatics to developing a self-correcting strategic renewal mechanism. Organisation strategies last three to five years, and the time it would take to perfect a repeatable actionable model is like to take the length of a multi-year strategic planning cycle. Hence the validation needs to happen in cycles. At the same time, IT consultants do not have time to make long-term commitments to subscribe to such a program without having *'immediate gratification'*. Therefore, the validation would use short cycles such as ones having four to six-week cycle. Such learning cycles can continue to exist beyond the time frame of the thesis.

Chapter Seven – Model validation action research cycle

7.1 Method of actionable model validation

Throughout this research, many attempts have been made to evaluate validity in a manner that is in line with the researcher's philosophical assumptions. Hence, the validation of the actionable model also has been done with the understanding of the term 'validity' in mind. Dick et al. (2014) state that, unlike positivist research, qualitative research methods such as action research do not have a well agreed upon validation criteria. In fact, they are divided into two camps- one who believes that validity should be replaced by other terms, while others are relying on using the term with appropriate modifications as relevant to action research. For example, some use quality in place of validity or trustworthiness as an exchangeable word (Ibid, 2014). Similar to the view of Yvonna Lincoln that the qualitative research should develop its own evaluation criteria (Ibid, 2014), I conducted the research in a manner that during each research cycle, it attempted to validate the outcome of the previous research cycle. That way, I could determine which concepts repeatedly emerged during each intervention [high repeatability] and which concepts cannot be confirmed in a reliable manner. For example, during the pre-stage of the research, I developed my own perspective of the emerging problem. During the problematizing research cycle, I allowed my perspectives to be challenged via democratic participation. During that encounter, I found many perspectives that are not fully in line with my understanding. In fact, one participant [Naren] had the complete opposite perspective of mine. Then I conducted thematic and content analysis on all the available perspectives. As a result, I could use the repeatability of co-occurring themes in many dialogues to inductively establish a combined perspective that is clearer than my original perspective. As the outcome of the problematizing research cycle, a much more internally focused [focused on the participant] problem definition and three vicious cycles were identified.

Although the terms '*internal validity*' and '*external validity*' are more relevant to quantitative research, I could carry out a conceptually similar form of validation of the three vicious cycles by means of analysing the statistically significant larger number of dialogues collected from a broader spectrum of stakeholders [external to the collaborative action research group]. During this data analysis, the emergence of similar thematic relationships that were seen in relevance to the three vicious cycles during the previous research cycle helped to determine that the three vicious cycles can be inductively confirmed. Whatever the knowledge gaps remained after the data analysis were

filled by the knowledge extracted from peer-reviewed scholarly articles published in highly rated research journals. The inclusion of such externally validated knowledge improves the rigour of this research findings. Rigour can be translated to trustworthiness (Dick et al., 2014), while relevance can be more critical for validity from a pragmatic perspective (Ibid, 2014). Hence, increased relevance achieved through inductively analysing the dialogues between participants and the use of rigour achieved through the inclusion of externally validated scholarly articles is important for validity.

When speaking of validity in qualitative research, the three types of validity proposed by Steinar Kvale (Dick et al., 2014) become entirely appropriate for understanding the evaluation criteria for this research. Throughout the research, I have used journaling and reflexivity to ensure that I remained mindful during the research activities, which should contribute to the '*craftmanship*' (Ibid, 2014). The diversity of opinion exchanged during the dialogic activity between the participants [while not using coercive influence by the researcher] can be used as an indication of the higher degree of '*communicative validity*' (Ibid, 2014). Most importantly, this research can be evaluated for '*pragmatic validity*' (Ibid, 2014) by determining whether the research can yield favourable outcomes to the research participants. By design of the research, it is expected that the participants would achieve favourable outcomes by using the actionable model. Therefore, conducting this actionable model validation cycle is essential to determine the pragmatic validity of the research. Hence the remainder of this chapter will be dedicated to describing this pragmatic validation process that was applied during the model validation.

During the second chapter of this thesis, I intended to design the actionable model to be a continuously improving, changeable and adaptive solution that is supposed to learn using a 'double-loop learning' approach described by Argyris (2002). This idea means that the model would go through a cyclic evolutionary process in which, as people use it to their benefit, the model can be improved based on the learning from each usage cycle. Each such usage cycle can be considered as a validation cycle. As soon as the initial structure of the model was defined, it was introduced to the collaborative research participants. They became the first set of users of the model. This validation action research cycle continued for about fourteen weeks. In this chapter, I will be using the learning during this action research cycle to conduct the first validation of the model, which falls under the scope of this thesis. The subsequent validation cycles will not be within the scope of this thesis research.

7.2 Implementing actions using the actionable model

All the thesis analysis details were not provided to the collaborative action research group participants during the validation cycle. Within the core research project, only the matters related to the practitioners were discussed, not the scholarly analysis or the literature. Therefore, the collaborative research participants received the actionable model as a deliverable from the thesis project. Since they did not see how the model was logically developed, I needed to demonstrate the details of how I used the model for my benefit as an IT professional [I have dual participatory roles as the owner of Princeton Pragmatics and as an IT professional]. This demonstration allowed me to expose the actual enactment for the reflexive critique by the collaborative group participants. In addition, it motivated the other group members to reflect on how they would like to benefit from the actionable model. As it was described in section 7.1, to evaluate pragmatic validity it is essential to determine if the actionable model produced favourable outcomes to the participants. Personally, I evaluated the usefulness of the actionable model to help me to carryout sound diagnosis of my situation regarding my marketability in the IT consulting field and then taking necessary actions. Also, the other participants of the collaborative action research group tried to use the actionable model to see if they can benefit from it. Section 7.2.1 is dedicated to elaborating how I validated my own actions [first-person inquiry], while section 7.2.2 articulates what was understood from the reflections by others about their own experience [second-person inquiry].

7.2.1 The first-person inquiry of validation – demonstration of my action implementations

In my use of the actionable model, I wanted to learn-in-action in an attempt to remedy a particular adverse scenario. As I took each individual action, I simultaneously processed the feedback received from the collaborative action research group, which allowed me to fine-tune my subsequent steps. As a result, some of the details of my concrete actions had slight deviations to what was thought in the initial design of the actionable model [for example, some details of the trend discovery had a slight difference from the generalised structure of the initially proposed trend discovery mechanism]. This deviation is the desired consequence of designing the model to be flexible enough to continuously improve in action research cycles.

7.2.1.1 Implementation of my trend discovery mechanism

Figure 16.0 depicts how various information sources I selected based on my present needs have been synthesised to form a combined web of knowledge that would feed my decision-making process. This integrated web of knowledge would constantly deliver information about the emerging change. I have selected six industry leaders to follow and five internet-based forums to deliver emerging technology trends. The trends related to the job market will be collected from three of the leading career-related job and social networking web platforms. It also relies on direct recruiter communications and the public postings of the jobs by the clients. On an ongoing basis, I will also be sensitive to the changes in the client's technology strategies, which would affect the demand. Combining this information flowing from various sources, I spend five to ten minutes each day to understand if there are any gaps that need to address by me as an IT professional. During the validation, the peer-participant discussions within the collaborative action research group about the model revealed an interesting optimisation to the original design. It was noted that the IT consultants constantly need to discover matters related to the emerging trend. In addition, when they discover knowledge gaps in that process, they need to be able to discover additional knowledge related to new skills. Such knowledge could have been accumulated via the same trend discovery mechanism with some slight modifications to the original design. As a reflexive response to the learning-in-action, I immediately adopted it in my implementation of the trend discovery.

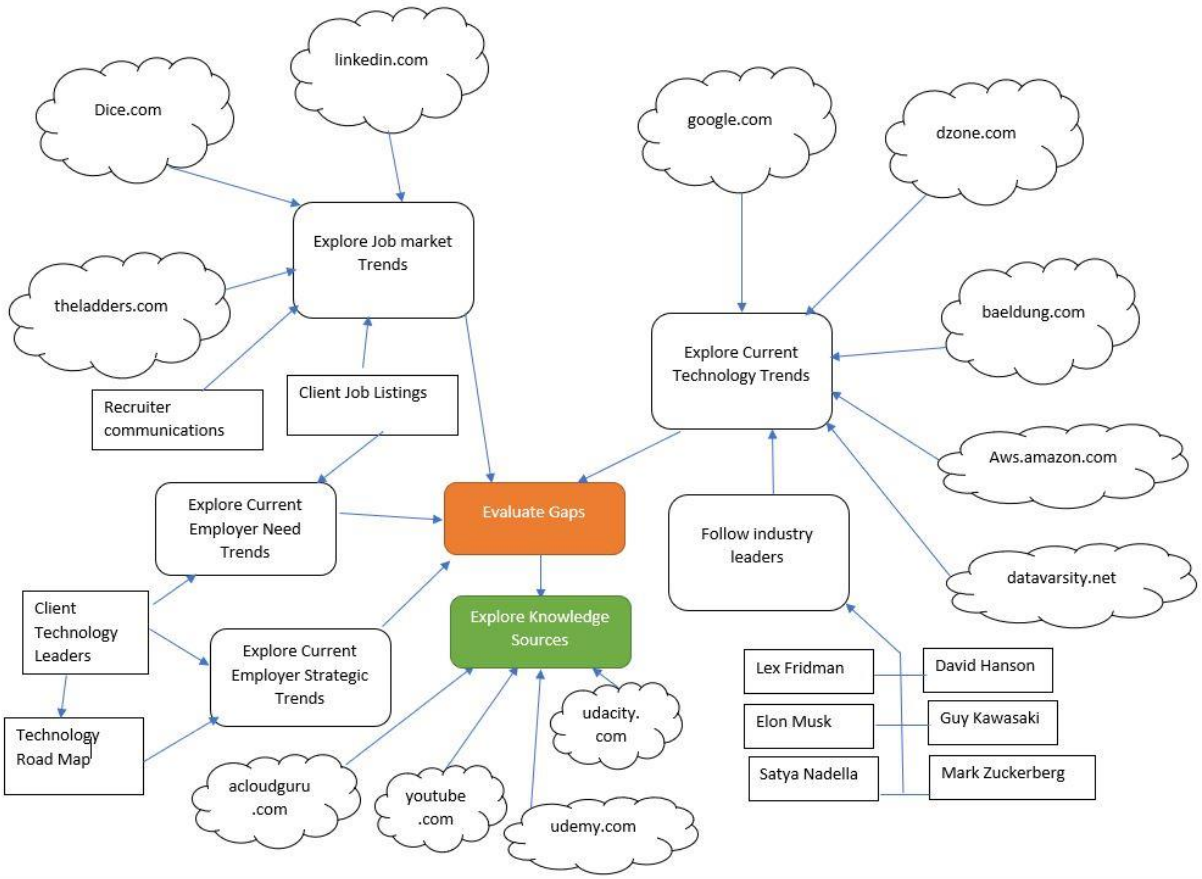

Figure 16.0 illustration of my personal trend discovery implementation for the next six months.

As it can be seen in Figure 16.0, the structure of my trend discovery process has a resemblance to the structure recommended in Figure 12.0 in chapter six. However, the process described in Figure 16.0 has several sources of information that are relevant for me. In my role as an IT professional, I need to be aware of emerging trends in cloud automation [amazon web services in particular], big data, microservices, and software development trends. The websites providing inputs to the current technology trends have a great potential to deliver the relevant information to my requirements. The three job-search related websites feeding information to job market trends activity have gained a lot of reputation among the IT professionals for being able to provide accurate and current information about the available job requirements for specific skills and pay rate. During the research interviews, several participants showed the same level of confidence about the four websites feeding knowledge to the knowledge sources. I spent time evaluating the quality of resources available from these sources and decided to explore those channels. Finally, the six individuals whom I follow as industry

leaders are great influencers of the technology trends. These sources can change when changes to the emerging trend happen, but at the time of the model validation cycle, the integration of these sources to the trend discovery process seems appropriate.

7.2.1.2 Implementation of a self-assessment

During chapter six, a detailed explanation of the design rationale for a self-assessment was provided. When I used the assessment for my particular case, it resulted in a lengthy questionnaire of hundred and fifty-three simple questions. Against each question, I wrote down the interpretation of each answer. Therefore, I had the list of questions as a separate Microsoft Excel document, while I maintained the interpretations for the possible responses to those questions as a different chart. It took about eight hours to construct this questionnaire for my own use. But this eight-hour time period is a one-time effort because the questionnaire can be re-used.

I shared the list of questions as a demonstration for the collaborative action research group. I allowed about two weeks to pass before I shared to the group the interpretations for the possible answers. It motivated most participants to attempt the questionnaire prepared for my own needs for their specific assessments in an unbiased manner [since they lacked first-hand information of how I would interpret the responses]. The ability to re-use model artefacts designed for my own needs by the others was not a requirement of the model design. The intention of this level of sharing helped to ignite second-person inquiry, which will be discussed in section 7.2.2. The waiting period allowed me to forget what I had written in the interpretation sheet. After two weeks, I attempted to answer the questions. Once questions have been answered, the answers were kept confidential. This whole process of answering and interpreting the answers took about two hours. The two hours of time for this level of assessment may be necessary for about every six months when doing a re-assessment would be appropriate.

Up to now, I had established a trend discovery mechanism for myself and then carried out a self-assessment in an effort to demonstrate how the model can be used for my situation. What is left is to demonstrate how to take actions based on the diagnosis. Based on the assessment, I decided to implement a set of actions to address my particular situation as described in the following section.

7.2.1.3 Using the heuristic devices

The trend discovery revealed to me that in my particular case, the practice environment is becoming less dependent on solutions that rely on vendor-specific cloud technology enablers. The companies would still need to rely on the vendors, but they do not want to make their solutions depend on the vendors. Another information that I gathered from a financial investment advisory suggested that some disruptive new technologies may be emerging to displace incumbent cloud technology leaders. My research on the job market revealed to me that I have the potential to invest time in developing thirty-seven new technology skills that have the highest demand in the market.

On the other hand, somewhat confidential self-assessment revealed to me that, although I am not entangled with any of the three vicious cycles due to self-efficacy [since I take the initiative to lead through this research], I need to be cautious about the vulnerabilities associated with the vicious cycle due to resource limitations. Hence, I referenced the heuristic tool designed to recommend action templates to deal with **resource limitations**. The heuristic map suggested the following action categories as more relevant.

- **Increasing awareness of emerging technologies**
- **Understanding where the demand is**
- **Effective strategies, time management and effective learning tactics**

As soon as the heuristic map narrowed down the most relevant categories, I only had to decide on the most relevant action templates from the action catalogue for addressing the concerns of resource limitations involving the above categories. The action catalogue helped me to select the following six generic action templates, which I had to then translate into my specific context.

As the first generic template suggested, the use of search engines during the trend discovery to understand emerging technologies related to AI and Automation, and then coming up with a list of such technologies could be plausible. Next, evaluate what skills are required to adopt those that seemed to be appropriate. When I applied this guideline to my context using the search engines, I discovered the fact that I could perfect the mastery of thirty-seven skills. The process of mining this information and prioritising it as relevant was the first action which was implemented by me.

Secondly, the suggested templates for me revealed the need to determine which skill sets are likely to generate more demand. Then try to achieve skill development in that area. Attempting to focus on

thirty-seven different technology skills at once can be metaphorically considered like an attempt to "boil an ocean". An effective strategy is to find what area of expertise can find more demand immediately. The exploration of the direct queries to Princeton Pragmatics by the third-party recruiters revealed an Artificial Intelligence related skill called Machine Learning development in Python language. For various roles ranging from senior IT consultant to the role of head of analytics, this skill would increase the marketability of the individual. Therefore, this action involved the discovery and prioritisation of the development of machine learning skills in Python Language, particular with using modules like SciPy and TensorFlow for my scenario.

Due to resource limitations revealed by my self-assessment, the heuristic device has been highlighting another template of actions that suggested to use of appropriate time management techniques. So, I calculated the unused number of hours after eliminating mandatory hours needed per week for routine activities such as work. Then allocated mandatory 8 hrs per day of sleep time. Next, I scheduled the unused hours to optimally sized time slots to allocate for skill development.

For my particular situation, the heuristic device recommended using free technology training available from YouTube for specific skills. As an action, I devoted three hours, spending ten minutes evaluating each free learning course available on this new media channel relevant to Machine Learning in Python. During that time, I graded the available learning resources based on ease of understanding, style of teaching, the time it takes to complete the task and completeness.

The heuristic map also suggested that in my case, it would be more appropriate to avoid investing in time on learning material that takes a lot of time to accomplish. During my previous grading of the available content on YouTube, I recognised one instructor who uses an effective style of teaching which is more appealing to me. I could select three different learning material which would require about fourteen hours to cover the areas like a refresher on Python language, machine learning using Python, and AI-related programming using TensorFlow module with Python. I allocated a two-weeks and used the ten-hour per week time allocation schedule, which I reserved as the basis for following these free learning materials. Then I allocated six hours to do the hands-on practice of the skills.

When learning new technology skills, a first-time learner can benefit a lot if the learning can be hands-on. The heuristic map seems to recommend looking for learning opportunities that only provide cost to the vendor, such as product or cloud base platform evaluations. I discovered that the

"Google Collaboratory platform", a technology enabler that provides free access to system resources for encouraging the learning activities in Machine Learning. In this platform, all the technology resources required to try the work which can be learnt from the free learning courses could be accessed free of charge for a reasonable period.

7.2.2 Second-person inquiry of validation - Findings from the reflection of others in the collaborative action research group

The collaborative action research group participants have been extremely effective in providing support to validate the actionable model during the fourth action research cycle. The implementation details of each person's specific action models include a lot of tactics that give a competitive advantage to them individually. As an effort to meet the ethical obligations of this research, I have not probed into their personal details. Also, the participants did not reveal such sensitive information. Instead, they reflected on some of their excellent observations while attempting to make use of the actionable model.

In section 7.2.1.1, I revealed that I made a slight adjustment while doing my implementation of the trend discovery due to the influence from another participant on the importance of synthesising the task of "**exploring the sources of knowledge**". It was necessary because, while looking at the overview of the actionable model, that person could not figure out how to find the knowledge that is necessary to develop the required skills. Independent reflections from two of the participants in the research group revealed that recent uncertainty in the political landscape [upcoming presidential election of the U.S] could influence their career and whether the trend of automation and AI would further speed up or outsourcing will take over their jobs. Hence, they mentioned that their respective implementations of the trend discovery mechanism would include **scanning through the changing political landscape**.

The trend discovery mechanism was probably the least challenged component of the actionable model. Most of the individuals spent the time to answer the 153 questions in the self-assessment questionnaire, which I prepared for my personal assessment. It appeared that most individuals found that the self-assessment can be re-used by them.

When the enactment stage design was presented to the collaborative action research group, one individual provided a unique perspective about how he wants to use the model. Since the

components of the model are designed to be optional and adaptable, it was possible to address that individual's concern. The concern was that being a risk seeker, he wanted to avoid spending time on the diagnosis stage of the model. Instead, he wanted to immediately try the actions. It may be intuitive to think that a risk-seeking attitude may demonstrate the individual's belief that the change is controllable**.** Since that attitude is already in place, I could suggest that his approach would still be reasonable; provided that it would be highly desirable to use a double-loop style evaluation of whether this decision was helpful or not. If it is not helpful, then one could progress to the diagnosis stage.

On one occasion, it was observable that the model can deliver superior recommendations to individuals than what they would have otherwise decided without its help. For example, one individual was reacting to the belief that with the emergence of the novel AI and automation methods to the work environment, some companies can conduct unethical discriminations against employees of certain age groups. Also, he was going through the need to face extreme competition. His spontaneous reaction was to apply various marketing tactics, which were primarily focused on dealing with competition. When the model was used, it provided a broader perspective to him, through which he could recognise during the reflections within the collaborative action research group that he could use some other alternative actions that would address competition as well as other complications arising due to age.

During section 7.2.1, I demonstrated how I could use every part of the actionable model for my benefit during the first validation cycle of this action research. Section 7.2.2 provided an overview of what was revealed after other participants in the collaborative action research group attempted to use the same model. The result was that the validation exposed areas for improvement as well as the strengths of the model. In section 7.3, I will describe, based on the learning from this validation, how the actionable model would change going forward to be used in the next cycle as a post thesis adoption of the model.

7.3 Amendments proposed to the actionable model based on the findings from the validation

The trend discovery mechanism involves synthesising various sources of knowledge and evidence to form a combined web of knowledge related to the emerging AI and automation trends related to the adopter's particular scenario. Those sources and information flow can be different for each

individual use case. Even for the same person, the priorities can change with time as the impact of the problem changes. The structure of the trend discovery component only outlines the essential parts that need to be integrated into the discovery information flow. However, the model validation cycle brought to the attention that it would be beneficial to introduce the ability to do discovery on the political trends and also to incorporate the discovery of knowledge sources that are required to implement corrective actions. This research was conducted during an extreme period in American politics due to the 2020 presidential election. Nevertheless, the understanding here is that, in general, the labour market gets impacted by the change of governments and their policies during more frequent elections in the USA [immigration policies and trends in outsourcing can change]. Hence the section of the overall actionable model which has to deal with the trend discovery has been introduced with two additional components, which are marked in green colour in Figure 17.0.

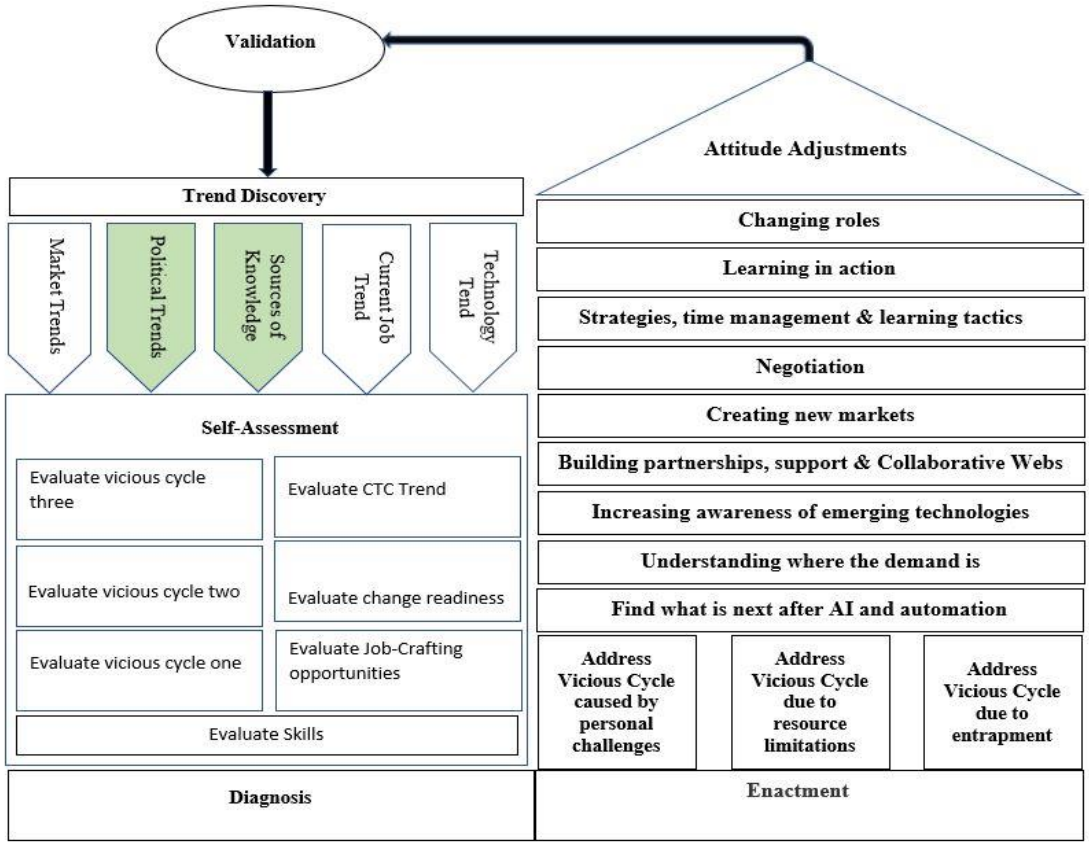

Figure 17.0 Overview of the Actionable Model with amendments.

7.4 Reflections and Conclusions

During the actionable model validation, most individuals could find something useful when applied in their specific scenarios. One of the critically discussed issues was that most IT professionals who have concerns with the three vicious cycles do not have that much time to discover possible actions. Some users of this model do not have time to try out all the actionable model components. The design of the actionable model gave utmost importance to support generating actions while other diagnosis elements of the model are necessary pre-requisites to enactment. However, being a flexible model, which has defined all its components to be optional, made it possible to retain the users who thought they wanted to continue using the model with the existing risk-seeking attitude. Since the design was influenced by double-loop learning, the model adopter can re-evaluate how the model was executed during each use and alter the model's structure.

Beyond the scope of this thesis, the refined actionable model will be introduced to a broader audience. As expected, it is going to provide more insights on improving each component of the model. There has to be a well-established protocol to make use of such new knowledge to alter the model and then to distribute it to its users. This need is quite common in every environment where models are being used. The establishment of such maintenance protocols can be addressed by a process called model governance. The model governance covered within the scope of this thesis would end after this stage; however, each time someone uses the model, it generates new knowledge. Therefore, it would be beneficial to continue the evolution of the model with a proper model governance mechanism in place. In this regard, Princeton Pragmatics can take managerial actions necessary to establish a model governance process that will engage other IT consultants and IT professionals to subscribe to a continuous model governance process so that the beneficiaries can learn from the experience of the others. That would necessitate actions that go beyond what was planned for the scope of this research.

In these concluding remarks of this chapter, it is worth devoting a few words to discuss whether the expected pragmatic validity has been achieved and how it was achieved. In this validation cycle, I could discover that I have the potential to improve thirty-seven new skills to remain easily marketable in the IT consulting job market. The action templates derived from the heuristic maps helped me to take several actions. That ultimately helped me to strongly improve six additional skills, for which the market has a much higher demand at the moment. Desai thought that '*This*

structured method helps us bring our attention to things we may know but never notice.'. With some further reflexivity from him during the validation, it was possible for me to change the trend discovery stage to discover educational resources. As a result, the model could become more useful. Kalupahana, on the other hand, could explore the political trends and determine that he needs to use an options strategy depending on the outcome of the Presidential election of the United States. For either scenario, he could summarise the set of actions that he was going to take. He could also witness how the heuristic maps showed him more optimal areas to work on during his enactment phase.

Sid could determine that despite his work style has symptoms of entrapment, his extremely high self-efficacy allowed him to craft his job to increase security in the present moment. Since the model demonstrated that it has a mechanism to apply double loop-learning and incorporate further changes in response to the validation results of each validation cycle, the design of the actionable model has reasonable consideration taken towards gradually improving the reliability of the model. At the moment, the collaborative action research group participants could find several favourable outcomes during the current model validation cycle. As a result, the actionable model has achieved the first stage towards pragmatic validity with the close participants of the research. During the next few cycles, this model will be validated with third persons who are not currently related to Princeton Pragmatics. This sort of external validation can help to improve the generalisability of the actionable model. This third-person inquiry will be outside of the scope of the thesis. In chapter eight, I will explain how the planning for this activity can unfold.

Chapter Eight – Discussion and Conclusion

8.1 Overview

As this DBA thesis concludes, I intend to dedicate this final chapter to discuss how the actionable model, which has been developed during the research, could evolve in the future. Since the research allowed developing a deeper understanding of the issue investigated by the overarching research question "**what strategies could Princeton Pragmatics and its IT consultant partners pursue in response to emerging trends in the adoption of automation and AI technologies?**", it leaves many implications for the executive actions of Princeton Pragmatics. Following the discussion of those implications, I intend to reflect on how I have evolved to become a scholarly practitioner.

This research has many other implications for many other interest groups. During the initiation of this research and while doing a comprehensive literature review, it was not possible to find much research concerning the impact of the adoption of AI and automation on the consulting industry. Since this research focused on the IT consultants as the unit of analysis, it is likely to provide many others involved in the consulting industry insights into navigating through the emerging technology disruption. Hence, discussing those implications deserve a few words in this chapter. This thesis research has been designed to operate as two projects. The core project assisted me in managing the activities involved in the collaborative practise environment with a group of IT consultants. The second project involved composing this doctoral thesis, which also aims to provide implications for scholarly research. Therefore, a subsection of this chapter will be allocated to describe the implications for scholarly research. Another unique feature of this research is that the bulk of actions were conducted during one of the worst global pandemics ever faced during the entire human history, making it an extremely difficult task to meet others in person. However, due to the nature of the data collection techniques used, this research could continue amidst the COVID-19 pandemic. Hence, I will use a subsection of this discussion to reflect on how this action research remained unimpacted by the COVID-19 pandemic. Finally, I would conclude this chapter and this thesis by providing the overall conclusions from this research.

8.2 Future evolution of the actionable model

The initial validation of the actionable model in the final action research cycle could be considered as one of the first few steps of many future validation efforts. Such an iterative approach may be essential to improve the model to become more generalisable and widely adoptable to address the issues faced by IT professionals due to the rapid adoption of AI and Automation. Hence it is critical to reflect on some of the key aspects that it needs to develop to improve towards becoming a more useful model in broader contexts outside of Princeton Pragmatics at this stage of the research. First and foremost, it is necessary to understand who the users of this actionable model will be. A typical model user is likely to be an IT consultant or professional who works for more than 50 hours per week while facing all sorts of challenges identified during this research. In the name of assisting them in finding solutions to their issues, the model itself cannot introduce further burdens to the community of users. Hence the model has to be cost-effective, easy to use and less time consuming to apply.

The actionable model has been introduced as a part of this thesis, which makes it publicly accessible knowledge. When adopting the actionable model, different individuals will implement it in different ways; thus, it becomes a self-implemented model. Self-implemented solutions are cost-effective because it does not incur third-party management costs. The biggest challenge of the actionable model is to make it simpler and less time-consuming to apply. The strategy used in the design is to couple an action template catalogue that can work as a database of previously validated recipes of actions to address specific situations related to the problem. The entries in the action catalogue may not be misunderstood as an effort to prescribe actions to its users. Instead, it acts as a heuristic enabler that increases the efficiency of making decisions on making actions. Hence, the evolution of the action catalogue could continue to maintain that primary assumption. However, only through routine review of the action catalogue and heuristic map can this actionable model be more user-friendly, efficient and feasible. The types of wicked problems faced by IT professionals are not trivial enough for individuals to solve them. I find *'Crowdsourcing'* (Howe, 2013) to be a useful innovative approach to make this complex task become thousands of simpler tasks that busy individuals can accomplish, contributing to the knowledge creation by simultaneously and iteratively validating the actionable model and its components. Eventually, the collective effort can potentially create more efficient versions of this actionable model.

8.3 Implications from this research towards executive actions of Princeton Pragmatics

In chapter six, while elaborating the actionable model, I disclosed that although this research's primary focus was about helping IT professionals, there are several management implications for Princeton Pragmatics as a company. The actionable model unveiled in this thesis is a result of an effort by Princeton Pragmatics. Hence the company would consider it an important task to facilitate the governance of the model's evolution. The precursor for this governance has already begun as a part of the final research cycle. Any model at its infancy has a burden to justify its existence to its users. Like any other product commonly found in the software industry, this actionable model has gone through a "beta-test", which exposed it to the most reliable users who would appreciate its potential to become a real product. In this case, the beta-test was carried out within the collaborative action research group. When the suggested amendments have been applied to the model, it is now more suitable to be presented to a larger audience. Since this thesis must undergo a strict examination process, it needs to wait until the examination procedures come to completion. Hence, as the first action beyond the thesis, Princeton Pragmatics could consider introducing the model to a broader audience. During the validation process within the collaborative action research group, it has been a little challenging to explain the usability of the model because whatever the interventions that could be carried out were limited by what was approved by the University of Liverpool research ethics committee. When going forward, more creative approaches to educate others on the model can be tried as such actions will not fall within the scope of the research. Such an effort can involve one-on-one demonstrations or new media-based verbal and graphical content that can be hosted via YouTube channels.

Once the model gets distributed to a broader audience, it becomes a necessity to have a model governance mechanism. It would be intuitive to expect a synthesis of crowdsourcing [by creating feedback loops between the model governance body and its users] to provide feedback on improvements and adjustments that may be applicable to the model and its components. Periodically (perhaps every six months), it may be necessary to re-distribute the updates related to the model to its subscribers. Doing this activity repeatedly and robustly to a group larger than six individuals will demand reliability. Hence, the use of new media-based collaboration channels [possibly model governance blog hosted via the Princeton Pragmatics website] or other channels like the LinkedIn professional groups may be considered as viable approaches.

Apart from actionable model governance, this research has produced several inputs to the strategic thinking process, which will be able to formulate a strategic renewal for the company. No company which is willing to implement a strategic renewal of this form is likely to reveal the details of such actions in a published thesis before it can be implemented. In this regard, Princeton Pragmatics is no exception. Hence, during this discussion, only a brief description can be made. For the past three years, this company has been purely an IT services company that operated on a small scale with established strategic alliances with larger firms. This research pointed out that it will be worthwhile to question what is after AI? AI creates its own problems, and as an IT company, Princeton Pragmatics can find ways to provide solutions that can address such issues. In this research, the overarching research question which has been explored itself is such a problem. Hence, exploring opportunities to develop products to help to address the concerns of the three vicious cycle with the partnership of others can be treated as one form of strategic renewal. On the other hand, it is necessary to restructure the service offerings by means of its core competency, the consulting services, to meet the future market demand. The trend discovery and the actionable model can be further used to help in this regard. This is where the feedback loops between IT consultants and Princeton Pragmatics can help feed IT consultants' experience to identify emerging patterns or trends to shape the company's future strategy. When making this assumption, I am aware of the possible tensions that may arise when people decide whether to subscribe to the strategy. Based on my observations, the adaptation process of individuals can result in certain patterns in my small company due to individuals polarising against popular trends. For example, certain types of specialists might choose to align with specific career paths developing attractive skills for those career paths. The number of individuals relying on my company to find work projects are limited. Hence, they are likely to settle into a limited number of emerging patterns of existence [by means of individuals adapting to new career paths], which can potentially change more frequently. Then the goal of the organisation's strategic renewal will require finding ways to adapt to these stable patterns.

8.4 Reflexivity from my learning during my journey towards becoming a scholarly practitioner

When I first enrolled on the DBA programme of the University of Liverpool, I joined as a professional who had about seventeen years of career experience with a computer science background, having completed a masters degree and an MBA related to technology management.

Until then, I used to look at problems in the world as an objective thinker due to my long exposure to mathematics, engineering, and traditional sciences. Through the learning from the DBA programme, I realised that problems resulting from social interactions are wicked and multi-faceted compared to puzzles that are being solved in traditional sciences. Over two and a half years of disciplined learning prior to the start of this thesis, I gradually learnt to appreciate the different ontologies and epistemological approaches used in dealing with research problems. The DBA programme gave me the opportunity to learn various management research methods covering a broader range of quantitative, qualitative and mixed-method research. A great deal of Critical Action Learning and in-depth study of doing action research helped me to understand the strengths and weaknesses of different research methods in different situations. As a result, it was possible for me to indulge in doing collaborative action research during my thesis research.

At the start of the research, I lacked the ability to determine the scope of DBA research as I started as someone with zero experience in doing DBA thesis research. I have been able to understand the scope that needs to be covered within a DBA thesis. As a result, during the design of the research, it was possible for me to learn how to prioritise the work as "in-scope" for the thesis and as "post-thesis" activities.

Reflexivity is one of the valuable skills which I gained due to my learning in the DBA programme. It is also the most challenging and debated experience of learning in my DBA studies. During the learning modules, I established a style of reflexivity in my writing using the influence of two scholarly articles. Hibbert et al. (2010) explained reflexivity as a process that involves reflection done in the form of recursion. This recursion can happen unnoticed by the researcher in a manner which they call passive recursion or in a more explicit and active recursion. These reflections involved in reflexivity requires the researcher to challenge original assumptions and further analyse actions. Undoubtedly, reflexivity involves a great deal of re-evaluating one's own actions by looking inwards. I did this to a great extent in the form of journaling. I provided transparency to this activity by sharing my research journal with my supervisor during monthly reviews. However, I decided to give less importance to what I learnt by applying reflexivity to my own actions to be included in the thesis during its writing. I made that decision because I interpreted the claim of Karl Weick that 'In the name of reflexivity, many of us tend to be more interested in our own practices than in those of anybody else ... That is non-reflective narcissism' (Weick, 2002, p.898) to be an indication that those

who produce scholarly work should do only a little reflexivity about one's own. Nevertheless, this thesis had gone through several stages of peer-review, and such feedback suggested otherwise. The readers wanted to see more of my inner reflexivity to be demonstrated in the thesis. It required several recursive dialogues in the form of writing with citations and verbal discussions with my supervisor to demystify the understanding of how much should be included in the thesis. It was brought to my attention that the understanding of Cunliffe (2004) has been re-published several times by reputed journals, and for the Liverpool DBA thesis, getting the influence from her work would be more relevant. Reading through her article once again helped me to understand that reflexivity is a much-debated topic (Ibid, 2004, p.407) among scholars. According to her, researchers could use journaling as a means of improving their reflexivity skills. Furthermore, she does not believe that critically reflexive journaling can be considered as naval gazing. If so, I should have become more comfortable in discussing my learning through journaling in a more reflexive manner in the thesis. It took a lot of recursive effort by me engaging with my supervisor to come to this position on reflexivity.

Despite my initial reluctance [reflex] to disclose too much about the details of my learning from research journaling due to the pre-established assumptions [justified using scholarly literature], I did journal for my own benefit. The ORJI framework, which I described in section 2.7, orchestrated me through a recursive assessment of my own assumptions and actions taken as reactions to initial observations. This reflective analysis on the reflex (reaction) done during the judgment stage helped me to think about what I did and what I want to be doing. For example, journaling much of my work in the collaborative action research group gave me insights through reflexivity, which helped me to develop as a researcher. Therefore, it is worthwhile to explain a few of those moments how reflexivity allowed me to choose appropriate behaviour.

My collaborative action research group work proved to be different from any other previous encounters in the practice environment. In a typical work environment, individuals contribute to teams to fulfil their job duties, and they are paid for doing that. In most cases, not every participant is a peer. In this case, I worked with a group of volunteers who are not motivated by any personal rewards engaged in the research in democratic participation as peers.

As I described in section 2.6.1, I was aware of the formal and informal powers (Mechanic, 1962) that exist in various settings, but during my work in the collaborative action research group, I

consciously eliminated the use of any formal power to get things done in my way as in my eyes, such an effort would be considered coercive. If I am in the position of the participant, and the researcher whom I work with tried to use formal authority, I would feel that the researcher is attempting to restrict my democratic participation. I did not want my research participants to feel that way about me. Due to my pre-understanding of the research, I walked into the research group as someone who had additional knowledge gained through pre-understanding. Also, I could have used the knowledge which I might be gaining in the future due to the research as bait to motivate more dialogue in the research group. However, I refrained from using such informal power within the research group simply because I did not want any other researcher to do that with me if I am one of their participants. I will not use any intervention technique with my participants if that is not something that I would want someone else to use with me. This sequence of reaction and judgement happened unknowingly in the form of a passive recursion.

During the peer review of this thesis, the reviewers believed that I could have used informal power; therefore, it was not accurate for me to assume that I had zero power over the other research participants. Hence, I re-applied reflexivity in this regard. I questioned whether my stance on ethical behaviour as a researcher is right or wrong? When it comes to ethics, there are two perspectives called ethical absolutism and ethical relativism (McDonald, 2010). Ethical relativism suggests that what may appear to be ethical to one need not be always acceptable as ethical for someone else. When looking at ethical dilemmas occurring worldwide, one can find enough examples of such scenarios where different societies use different standards about ethics. If my relativistic position of ethics is less strict than the University of Liverpool's ethics standards, then it would be a problem. However, I had raised the bar for ethical conduct in research compared to average action research. The best evidence to judge the effectiveness of my decision is the ultimate result of the problematizing research cycle. Suppose I had not been able to generate enough dialogue that was sufficient to recognise the different perspectives of others. In that case, there is a good chance that my ethical stance contributed to it. However, chapter three should make my readers understand that it was the other way round. In fact, I had to make extra effort to limit what I can write in this thesis due to the established word limit of a DBA thesis.

Most importantly, I can be happy that this data collection was done in an ethical and uncoercive manner to my level of satisfaction and in consistence with my research ethics obligations [what I

committed to during the ethics approval process]. The lesson I learnt from this reflexivity exercise is that the researcher need not always find faults about one's decisions taken during reflex to a situation and later having to correct them. While that could be the norm, exceptions too could happen.

On several occasions, I found that certain assumptions and actions taken by me as a reflex to a particular situation could have been done differently to achieve a better outcome. Earlier I explained that my decision to take the side of one interpretation of reflexivity was proven to be inappropriate from a DBA thesis point of view. Another is that whenever I am encountered with a perspective of another that can contradict mine, my default stance had been to determine why my perspective is right. Due to my journaling experience, I could apply reflective analysis to this approach. In a paradigm where more relativistic assumptions are made about reality, this approach could lead to problems because there can be multiple truths. Had I used a more open stance towards exploring why the perspective of others can also be right, it would help me to give more space for other perspectives to exist. By the way, wholeheartedly, I wanted to achieve that during my research. But reflexivity on my own actions revealed that it is a skill that I can continue to improve. I am impressed that journaling helped me to recognise this area of improvement.

From the very start of the empirical phase of the research, some significant impact on my meta-cognition had occurred. I developed a self-awareness that I may have been going through a "curse-of-knowledge" (Bazerman and Moore,2009, p.39) bias leading me to think that others will be able to grasp the information which I present to them at the same efficiency which I possess. The fact of the matter was that none of the other participants had the luxury to get all the first-hand information that I received, as they did not have the exact same exposure I had [by virtue of being the primary researcher]. Feedback from my supervisor and the reflexivity done using the ORJI framework to capture reflection within the research journal helped me to understand the need to simplify the way I articulate findings.

While recognising my inherent biases, I could gain awareness about others. Initially, it was hard for me to get any response within the collaborative action research group. I realised that the participants are experts in their own area of work. Hence, I showed them that I am there in the group to do the bulk of research work for the benefit of everyone, and it would be up to them to consider me as someone who is there to work for them. It delivered some positive response, and the problematizing

effort done within the group has been instrumental to the success of the remaining stages of the research.

This action research is my first ever effort in collecting research data in the form of interviews. My exposure to the various research methods and data collection techniques helped me to apply the laddering techniques during the research interviews. I could gain the ability to see the holistic view and in-depth view about a problem area using the laddering approach. It is a skill that was proven to me as one of the most useful abilities to have as a management researcher. Laddering also helped me to find ways to triangulate each individuals' responses and, at times, discover inconsistencies in their responses.

Converting video recordings to written transcripts has been a tedious task. It required about nine hours to transcribe a single transcript. It required 153 hours of listening and typing seventeen lengthy video conversations. Managing time and endurance was critical in this regard, and being able to cope up with the unprecedented disturbances due to a suddenly emerged pandemic lock-down [COVID-19] was an unusual experience. It required me to be extremely strategic and disciplined about managing my work in research projects. In most cases, a lot of multi-tasking was necessary.

Although I had gained experience in coding of qualitative data, this research gave me plenty of experience in trying out coding the research data and deriving substantive theories from the collected data. For the first time, I learnt to use a qualitative analysis tool to help me systematically organise the coded data into analytical projects and generate graphical structures, which were helpful in carrying out inductive analysis of the data manually.

Every learning module which I followed before engaging in the thesis stressed research ethics and their importance. During the design of the thesis, an extensive review was conducted by the research ethics committee before approving to conduct the empirical phase of the research. Since then, I religiously followed the ethics guidelines. Initially, I followed it because I felt that I have an obligation to do so. However, following that obligation proved to be rewarding. The peak of the data collection and analysis activity of this research occurred during the time New York and New Jersey states had become the epicentre of the COVID-19 pandemic in the U.S. During the time of the research, four of the collaborative research group participants had some form of disturbances due to direct or indirect consequences of the pandemic.

8.5 Implications of this research to the consulting industry

At three different stages of this study, I have conducted an extensive search for existing scholarly publications related to my current research. First such exploration happened in early 2019 when I started focusing on designing of the research. Beyond the thesis proposal, I once again renewed my search effort during the writing of the first chapter of the thesis, which happened during the early part of 2020. During the late summer of 2020, I searched other sources once again for the sake of doing the post-analysis literature review. None of those efforts revealed any other research work which critically analysed the impact of the rapid adoption of AI and modern automation on the IT consulting industry. There has been some mentioning about marketing material published by some of the leading consulting firms, but the details available had not considered the critical issues faced by their human capital. Being a smaller consulting firm in the U.S, Princeton Pragmatics does not consider larger consulting firms as competitors; instead, it treats them as allies who complement by granting sub-contracting opportunities. The very fact that my company took leadership in this research does not mean that the prevalent issue in the consulting industry as a whole is a mere reflection of a weakness of the small firm which I founded. Rather, I treat it as a strength in its ability to foresee the emerging future earlier than many other incumbents. The amount of disclosure made available in this thesis helps any other consulting firm benefit from this knowledge becoming a public asset. I am hopeful as a scholarly practitioner that I will receive support from other consulting leaders to collaborate to achieve mutual benefit.

8.6 Implications for scholarly research

The findings from this research have many implications for multiple paradigms. As it was evident in the first chapter of the thesis, the discourse has been dominated by scholarly publications related to technology strategy and information systems. Since the management issue which is being investigated here is intertwined with an emerging new breed of technological innovation, it was essential to relate against such scholarly publications. However, this research is all about solving a management issue related to a small start-up IT organisation which required assisting fellow IT professionals in navigating through the career issues arising due to the emerging phenomenon. As a result, as the research progressed, the new knowledge created during the research, which was useful in taking actions towards navigating the issue found its epistemological roots in multiple branches in

management and social sciences. For example, while exploring the need to deal with experienced IT professionals' attitude issues, it was necessary to explore different types of attitudes and the current understanding of attitudes. The idea of the relevance of cognitive beliefs towards an attitude object mentioned by (Rafferty and Minbashian, 2019) leads to the recognition of change becoming the attitude object and finding the relationship of attitude towards change. The cognitive or the affective dimension leads to the synthesis of theories form human psychology such as psychological contract (Kiazad et al., 2019), change beliefs (Rafferty and Minbashian, 2019), change readiness (Armenakis and Fredenberger, 1997), and cynicism towards change (DeCelles et al., 2013). When exploring about overcoming negative attitudes, the reasons for proactive behaviour (Solberg and Wong, 2016), self-efficacy (Vardaman et al., 2016), job-crafting (Niessen et al., 2016) were found to be highly relevant. Most importantly, the role of the established social identity explained by Beyer and Hannah (2002) pointed out how certain attitudes develop among IT professionals when changing jobs. Any scholar exploring these theories from the perspective of changing the attitude of highly skilled IT professionals towards the way they do their job; this research would provide a lot of evidence on their relevance.

8.7 Implications from this research on doing action research during a global pandemic

Design of this research gave a lot of attention to the data collection. The collaborative action research group's design was influenced by Critical Action Learning group participation during the activities related to the DBA program's learning modules. I found the asynchronous participation to be very productive when dealing with busy professionals. I felt that my IT field experience, working with an onshore and offshore team could help conduct research interviews while maintaining a remote presence. That influence made me design the data collection interviews to rely on Skype-based video conferences which can be recorded. When this design was presented to the ethics committee, the global pandemic due to COVID-19 virus was never heard of in the United States or in the United Kingdom. However, when the spring had sprung in the year 2020, the U.S started turning into the epicentre of the pandemic. By early summer, New Jersey has had the second-highest impact from the virus. Being in the state of New Jersey, having a family-owned health practice [in addition to IT consulting practice] which increased the risk of exposure to the virus. If not for this design of data collection, this research would have completely stalled from where it started to take momentum. Even at this time of writing, New Jersey has been bracing for the second wave of the

virus. Therefore, I see another potential axiological value in my data collection technique to other action researchers doing action research during a global pandemic.

8.8 Planning the next steps for third-person inquiry

The research activity that falls under this thesis's scope ended with the conclusion of the fourth research cycle. Whatever the research work conducted within the stated four research cycles happened in accordance with the standards established by the University of Liverpool, and the research activities have been peer-reviewed. Since this problem will continue to evolve for many years from now, it will be necessary for Princeton Pragmatics to continue to study the impact of the emerging situation. Therefore, I would establish a new project to conduct further cycles of research. These future research cycles will be conducted based on the company's existing business practices, and the research progress will not be reported in the form of another published thesis.

As the next step of the research, it will be done to achieve third-person inquiry. It can be only done after this thesis is published and accepted. There are multiple challenges in doing this activity. The first challenge would be to find about twenty participants who have no previous connections with Princeton Pragmatics. For that, I can use a different sampling strategy. To find the right candidates for this activity, I would contact the existing participants of this research and do a *'snowballing'* (Easterby-Smith et al., 2012, p.229). I would request their help to find about twenty experienced IT professionals who do not have an issue with the referrer knowing about their involvement as long as the researcher maintains anonymity about their work. This effort requires re-writing of participant information sheets and participant consent forms. The method of participation does not have to be uniform for every participant. I will negotiate on the method of participation, which would use an exchange of information via emails and video conferences. I would inform them that their participation in the research will be at a personal level, and they should not attempt to do interventions in their own respective places of employment. I will explain the issue and, more specifically, the three vicious cycles. Then I will try to find out whether these individuals can recognise the problem areas related to each vicious cycle. For those new participants who recognise the existence of vicious cycles in their environment, I would encourage them to use the actionable model and receive feedback. For this task, I would estimate that it would take about eight weeks.

After eight weeks, I will receive feedback from the participants. I will use the questions made available in Appendix C to guide my discussions with the participants to receive feedback.

As a second challenge, I would foresee that there can be relationship related tensions as there will be some distance between the third persons and me. These third persons will be completely new individuals who will be introduced by others. As a result, finding commitment and establishing longer participation would require a lot more effort than it took during the first four research cycles.

8.9 Overall conclusions of this research

It was during the fall of 2017; I started sensing a trend of rapidly emerging new species of artificial intelligence capable technologies being adopted in the financial industry. What was started as chatbots which began replacing call centre workers, seemed to influence the careers of certain IT professionals as early as the spring of 2019. With this pre-understanding, I initiated the work of the collaborative action research group as soon as the ethics approval to proceed towards the empirical stage of the research was communicated to me. As I started problematizing the issue within the research group, my research on external sources revealed the advancement of the humanoid robots [one even gaining citizenship of a country], which led many people in the public domain to argue whether machines which are nearly intelligent as humans will walk on the surface of the earth earlier than expected. However, exploring the available scholarly articles [even among technology research] exhibited a scholarly divide. One camp has been suggesting that the emerging trend is different this time, while others argue that it is a repetition of the history for which humans need not worry that much. Their argument was that 'Polanyi's paradox' (Autor, 2015) would continue to prevail as a means of preserving the superiority of human intelligence.

When problematizing effort was completed within the action research group, the same divide was visible among the participants, although there were more participants who felt that there is an issue which has a greater concern to them. However, this time, the problematizing effort re-framed the issue as three different inherent vulnerabilities of experienced IT professionals in the light of this emergence of AI and modern Automation. I could uncover by doing qualitative analysis on the reflections made during the problematizing cycle the existence of three vicious cycles namely the "**vicious cycle due to personal challenges**", "**vicious cycle due to resource limitations**", and the "**vicious cycle due to entrapment**". With this understanding, I initiated an action research cycle

which collected data from seventeen individuals who had some professional relationship with Princeton Pragmatics. Even during the interviews, the same divide in the perspectives on the impact of the emerging situation existed among the participants. However, it was not possible to find a single participant who believed that what is known as “singularity” [human like machines] will come into existence within the next two decades. However, qualitative data analysis of nearly two hundred thousand words of interview data inductively confirmed the characteristics of each vicious cycle. In addition, the data analysis revealed many perspectives on how one could attempt to navigate the situation. Once the data analysis completed, it left one major gap in understanding. Many during the research interviews acknowledge that experienced IT professionals must change their attitudes towards the emerging situation if they want to survive through the imminent disruption. But no one could explain how. It is where the current body of knowledge in the area of attitude related to change proved to be superior in providing the right answers to the issue. With the help of synthesis achieved between proven scholarly research and the findings from data analysis, I could come up with an actionable model which has been described in detail in chapter six as a decision support heuristic device that can be used by IT professionals to help them navigate through the issue. The subsequent model validation cycle activities revealed that the actionable model is now ready to be adopted by a broader population. Although it has promising signs of getting evolved into a much-refined generalised model, it would require much more research to validate its relevance to the environments other than that of Princeton Pragmatics.

Since the start of the empirical stage of this research, the activities had to be carried out with extreme challenges. As mentioned earlier, if I had not made design considerations to use the advantage of technology to facilitate remote participation in the research activities, this research had all risks of getting stalled in the middle due to the COVID-19 global pandemic. Hence, the successful delivery of this thesis would surely remain as strong evidence to show that, with proper design, it would be possible to conduct action research even during a global pandemic which has the ability to lock down a world.

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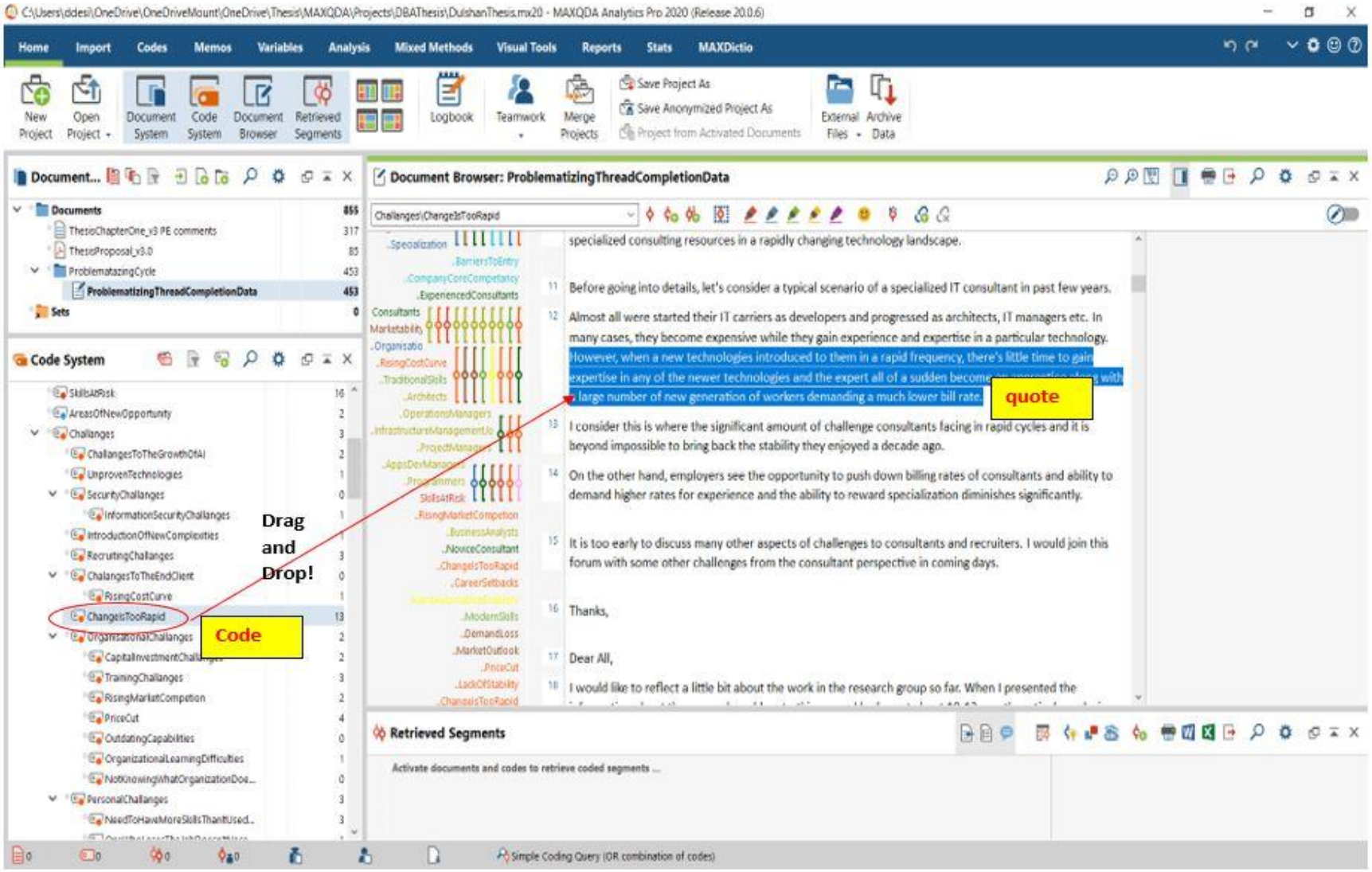
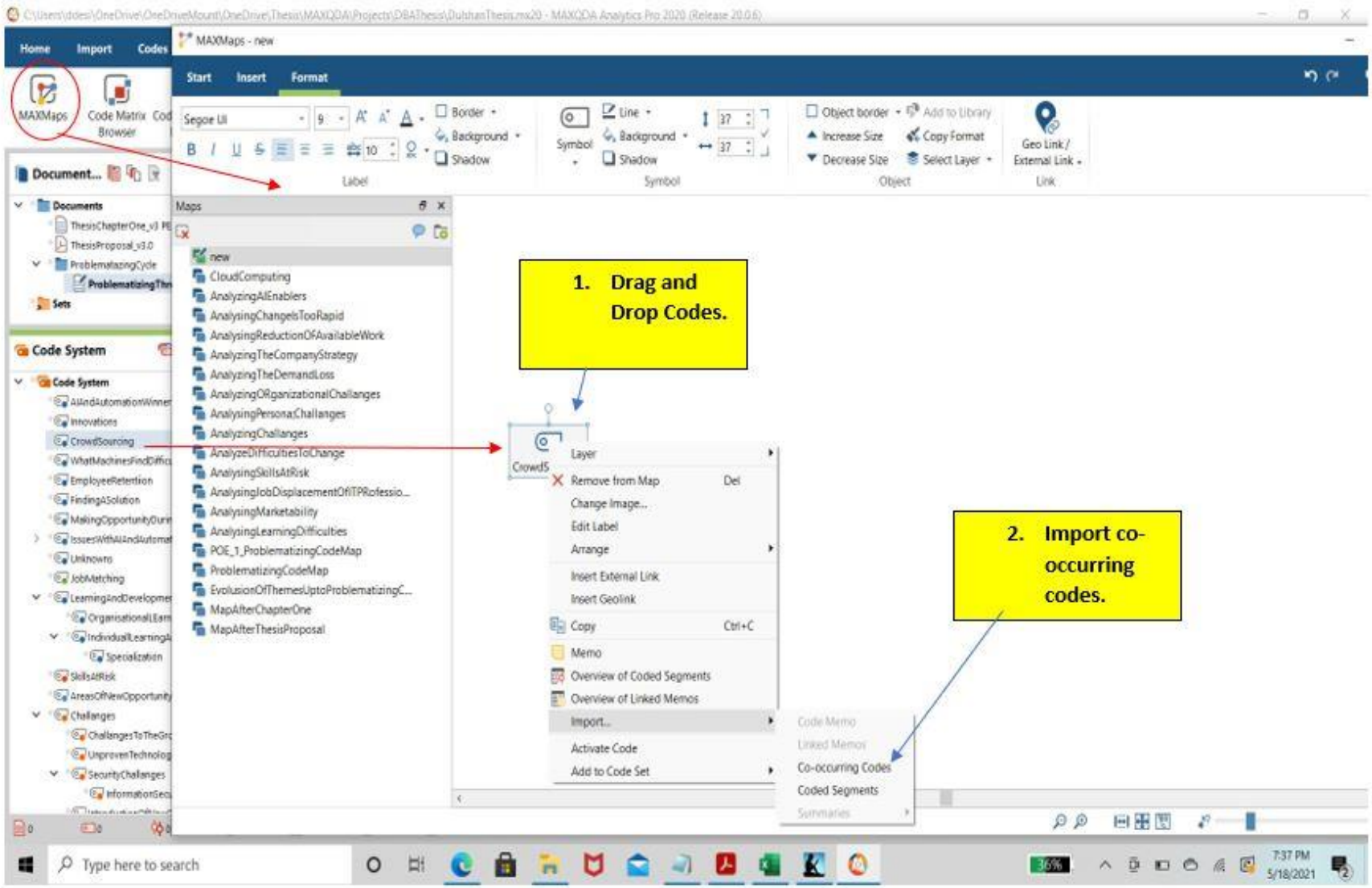
Appendix A

Example screenshots demonstrating how coding and analysis was done using MAXQDA Tool.

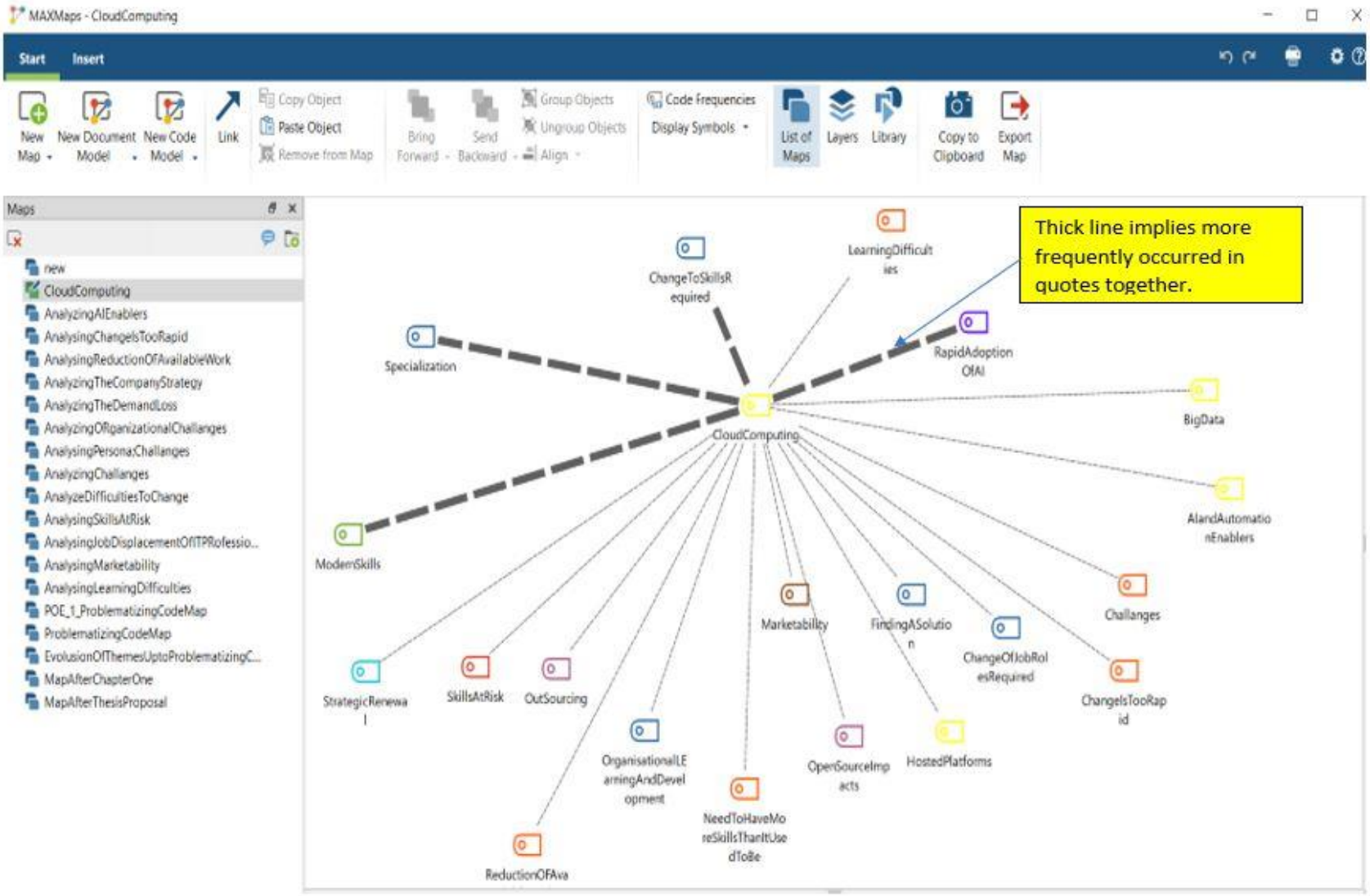
(1) Selecting text in the transcript as a quote and associating with a code (theme).



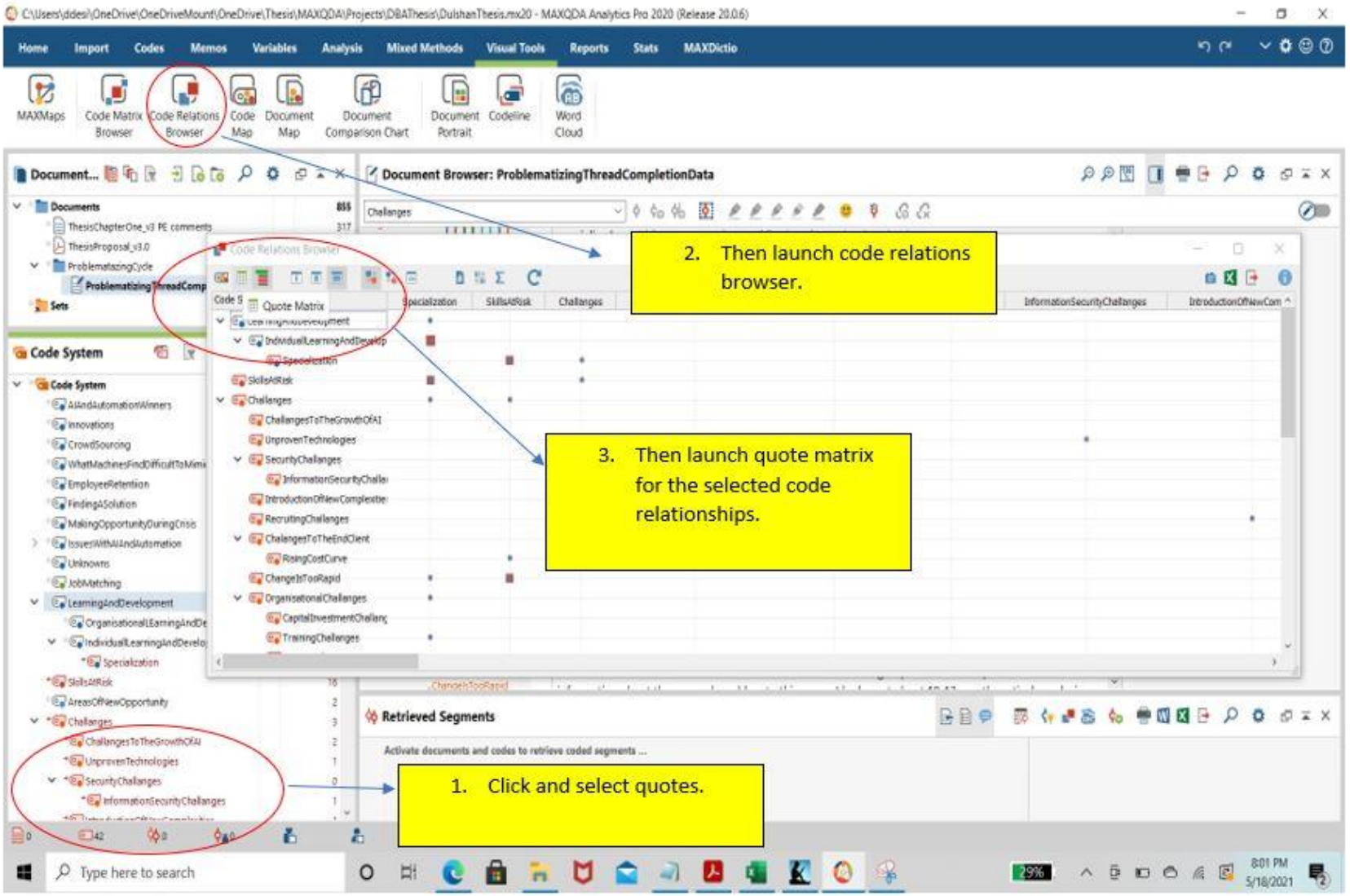
(2) Generating a MAXMAP for illustrating the relationships between themes that emerged during coding.



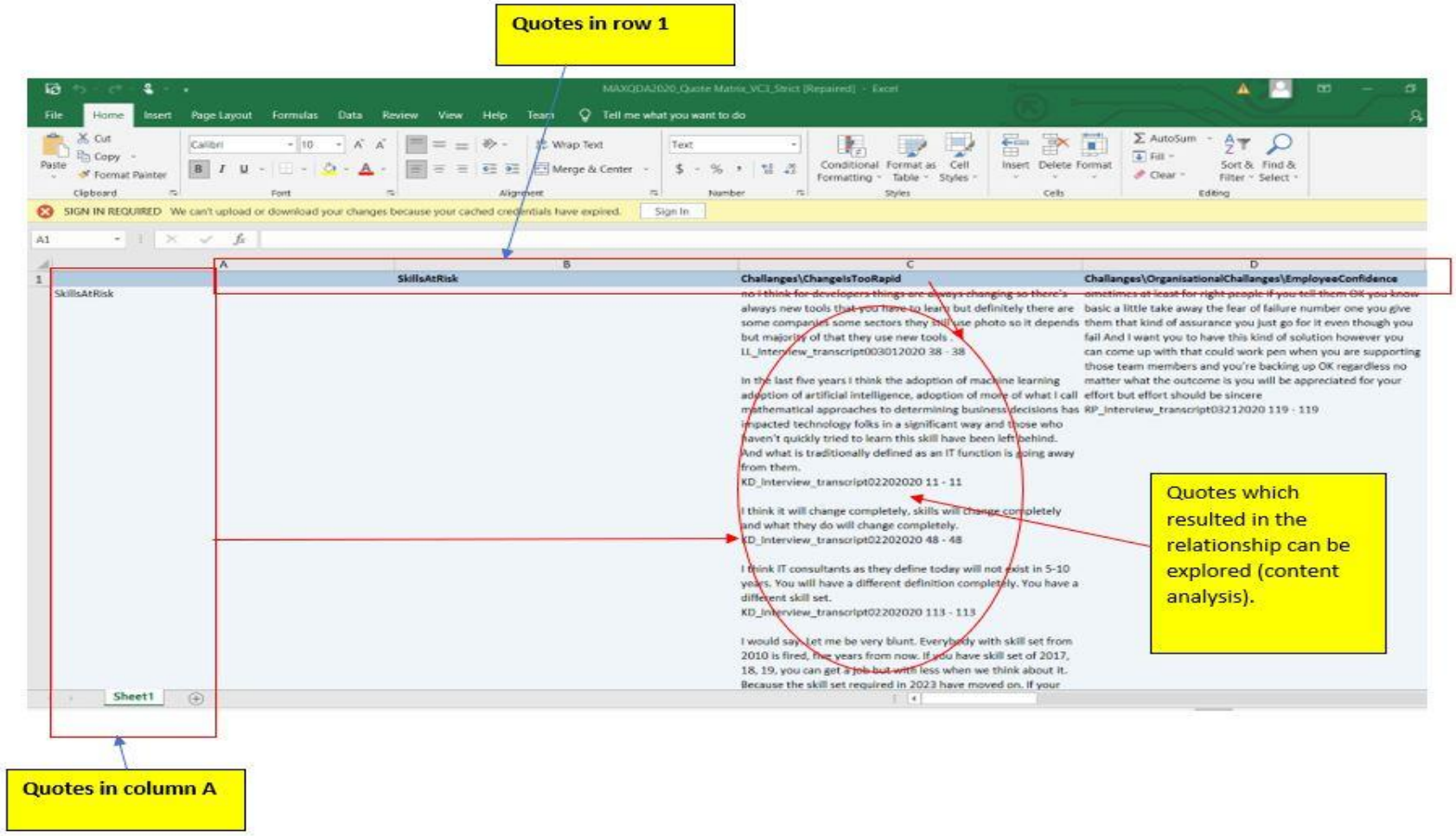
(3) A sample of a completed MAXMAP depicting how the central theme "Cloud Computing" related with other themes in the coded data.



(4) As the first step towards conducting a content analysis to determine the reasons for a particular relationship between co-occurring themes, it is possible to launch the "Code Relations Browser" for the selected codes (themes). Then launch the related quote map.

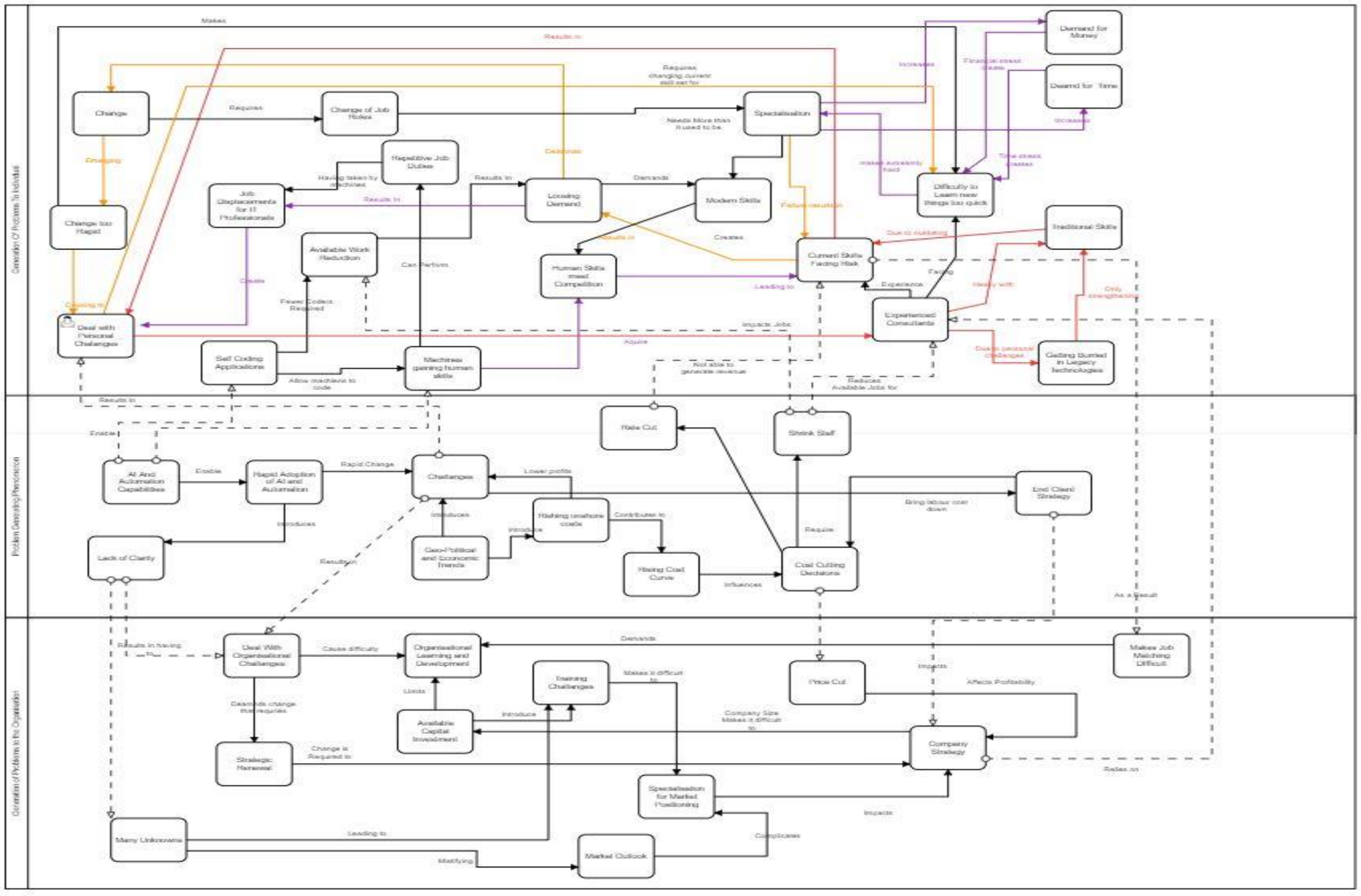


(5) The exported quote map will be an MS Excel spreadsheet structured as a matrix in which the first row and first column filled with each theme. The intersecting cell's corresponding row and column would lead to the relating codes. Understanding the quotes contained within this intersecting cell would explain the reasons for the relationship.



Appendix B

A screenshot of the abstract mental model of the problem documented using a business process modelling language while sensemaking during the content analysis of the data collected during the problematizing cycle. The relationships in this diagram might make sense only to the primary researcher who understands the inner workings of Princeton Pragmatics. This screenshot is provided only for illustration purposes only. Therefore the reader can appreciate how the scenario analysis was done by navigating through the paths that emerged in the diagram. When unique paths going in cycles were discovered, each unique path was assigned a different colour.



Appendix C

Questions to receive feedback from third person Enquiry.

Category	Question Number	Question
Understanding of the Rapid Adoption and Automation phenomenon	Q1	Do you think that your current work environment relies heavily on automation or using artificial intelligence?
	Q2	Can you recognise that automation or the use of AI agents have now been considered to reduce or totally replace the work done by IT professionals?
	Q3	Do you feel that the speed at which changes to the technologies being used has been increasing?
	Q4	On average, what is the length of a typical technological cycle (the time it takes for a particular technology to remain before it has to be renewed) in your opinion?
Vicious cycle due to personal challenges	Q5	Do you understand the "Vicious cycle due to personal challenges" as described in the material provided to you?
	Q6	Have you come across anyone who may have been experiencing the situation described by "Vicious cycle due to personal challenges"? Can you describe in what specific ways they encounter this issue?
	Q7	If you recognise the existence of the "Vicious cycle due to personal challenges" in your environment, do you recognise that there are other challenges that have not been discussed under personal challenges that can hinder the ability of an IT consultant to keep up with the emerging trend of automation and AI?
Vicious cycle due to resource limitations	Q8	Do you understand the "Vicious cycle due to resource limitations" as described in the material provided to you?
	Q9	Have you come across anyone who may have been experiencing the situation described by "Vicious cycle due to resource limitations"? Can you describe in what specific ways they encounter this issue?
	Q10	If you recognise the existence of the "Vicious cycle due to resource limitations" in your environment, do you recognise that there are other resource limitation related issues that have not been discussed under the vicious cycle due to resource limitations that can hinder the ability of an IT consultant to keep up with the emerging trend of automation and AI?
	Q11	Other than the availability of monetary funds and the availability of time as a resource, do you see if any other resources that may contribute to a vicious cycle scenario?
Vicious cycle due to entrapment	Q12	Do you understand the "Vicious cycle due to entrapment" as described in the material provided to you?
	Q13	Have you come across anyone who may have been experiencing the situation described by "Vicious cycle due to entrapment"? Can you describe in what specific ways they encounter this issue?
	Q14	In your work environment, for what specific reasons, people get stuck with one employer doing the same old thing for many years?
	Q15	Why do you think people are unable to see that their blind loyalty to an environment which does not allow skill growth can lead to loss of demand for their skills?
Taking Actions	Q16	Do you recognise that having an established process for yourself to discover the emerging trends as suggested by the trend discovery stage of the actionable model is useful?
	Q17	Can you share your experience with setting up a trend discovery process for your benefit?
	Q18	Does it take a lot of resources from you to learn from a trend discovery process? How often do you rely on that?
	Q19	Did you think about creating a self-assessment questionnaire to evaluate your situation?
	Q20	How useful is a self-assessment questionnaire?
	Q21	If you had used the self-assessment questionnaire, how many hours did you have to spend on creating it? How many hours did you spend answering those questions?
	Q22	If you used the self-assessment questionnaire, do you think it can be used again at a frequency of every six months?
	Q23	Did you attempt to use the heuristic maps and the action catalogue which was provided to you?
	Q24	Could you describe the level of convenience or the level of difficulty which you encountered while attempting to use it?
	Q25	Can you describe your experience in using the heuristic map along with the action catalogue?
	Q26	Do you think the use of an actionable model is beneficial than not having one at all?
	Q27	Did you end up taking actions without any help from the action catalogue because you did not think that the action catalogue did not have the right recommendation for you?
	Q28	Do you have any recommendations to improve any of the components of the actionable model? Will you be able to share it with others?
Willingness to subscribe	Q29	Will you be able to subscribe to a continuous exchange of knowledge on a voluntary basis with others like you and receive similar input from others so that it will help to improve the model as well as it can be beneficial to you?
	Q30	If you think you do not want to subscribe to a long-term information exchange about progress and the effectiveness of the actionable model, what are the reasons for that decision?